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BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

No. 47.

THE FISHES

OF

NORTH AND MIDDLE AMERICA:

A DESCRIPTIVE CATALOGUE OF THE SPECIES OF FISH-LIKE VERTEBRATES FOUND IN THE WATERS OF NORTH AMERICA, NORTH OF THE ISTHMUS OF PANAMA.

BY

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PRESIDENT OF THE LELAND STANFORD JUNIOR UNIVERSITY AND OF THE CALIFORNIA ACADEMY OF SCIENCES,

AND

BARTON WARREN EVERMANN, Ph. D.,
ICHTHYOLOGIST OF THE UNITED STATES FISH COMMISSION.

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PREFACE.

The present volume is the second part of a work descriptive of the fishes of North and Middle America, including all species known to occur in American waters north of the equator and of the Isthmus of Panama. The first part was published on October 3, 1896, the present part, continuous with the first in pagination and numbering, appears on October 3, 1898, and the third and final part will soon follow. In this last will appear the general index, an artificial key to the families, a glossary of scientific terms, and an addendum containing all species overlooked or described subsequent to the publication of the part to which they belong. A fourth volume, or atlas, is composed entirely of plates.

David Starr Jordan.
Barton Warren Evermann.

Leland Stanford Junior University,
Palo Alto, Santa Clara County, California.
March 15, 1898.

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1919. lentiginosum (Steindachner) 1524
1920. deppii (Heckel) 1524
Subgenus Archocentrus, Gill 1525
1921. nigrofasciatum (Günther) 1525
1922. multispinosum (Günther) 1525
1923. centrarchus (Gill & Bransford) 1526
Genus 616. Heros, Heckel 1526
1924. friedrichsthali, Heckel 1528
1925. salvini, Günther 1528
1926. affinis, Günther 1529
1927. maculipinnis, Steindachner 1529
1928. trimaculatus, Günther 1529
1929. labiatus, Günther 1530
1930. lobochilus, Günther 1530
1931. erythræus, Günther 1531
1932. basilaris, Gill & Bransford 1532
1933. nicarauguensis, Günther 1532
1934. managuensis, Günther 1533
1935. aureus, Günther 1533
1936. citrinellus, Günther 1534
1937. motaguensis, Günther 1534
1938. oblongus, Günther 1535
1939. dovii, Günther 1535
1940. gibbiceps, Steindachner 1536
1941. microphthalmus, Günther 1536
1942. urophthalmus, Günther 1537
1943. troscheli, Steindachner 1537
1944. cyanoguttatus (Baird & Girard) 1537
1945. pavonaceus, Garman 1538
1846. altifrons, Kner & Steindachner 1538
1947. beani, Jordan 1538
1948. tetracanthus (Cuvier & Valenciennes) 1539
Genus 617. Theraps, Günther 1540
1949. irregularis, Günther 1540
Genus 618. Neetroplus, Günther 1541
1950. nematopus, Günther 1541
1951. nicarauguensis, Gill & Bransford 1542
Genus 619. Satanoperca, Günther 1542
1952. crassilabris (Steindachner) 1542
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Genus 620. Azurina, Jordan & McGregor 1544
1953. hirundo, Jordan & McGregor 1544
Genus 621. Chromis, Cuvier 1545
Subgenus Furcaria, Poey 1546
1954. atrilobatus, Gill 1546
1955. cyaneus (Poey) 1547
1956. multilineatus (Guichenot) 1547
Subgenus Ayresia, Cooper 1548
1957. punctipinnis (Cooper) 1548
Subgenus Heliases, Cuvier & Valenciennes 1548
1958. insolatus (Cuvier & Valenciennes) 1548
1959. enchrysurus, Jordan & Gilbert 1548
Genus 622. Eupomacentrus, Bleeker 1549
Subgenus Eupomacentrus 1551
1960. leucorus (Gilbert) 1551
1961. adustus (Troschel) 1551

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1962. fuscus (Cuvier & Valenciennes) 1552
1963. diencæus, Jordan & Rutter 1552
1964. rectifrænum (Gill) 1553
1965. analis (Poey) 1554
1966. otophorus (Poey) 1555
1967. leucostictus (Müller & Troschel) 1555
1968. flaviventer (Troschel) 1557
1969. flavilatus (Gill) 1557
1970. partitus (Poey) 1558
1971. planifrons (Cuvier & Valenciennes) 1559
Genus 623. Nexilarius, Gilbert 1559
1972. concolor (Gill) 1559
Genus 624. Abudefduf, Forskål 1560
Subgenus Glyphisodon, Lacépède 1561
1973. saxatilis (Linnæus) 1561
Subgenus Euschistodus, Gill 1562
1974. declivifrons (Gill) 1562
1975. analogus (Gill) 1563
1976. taurus (Müller & Troschel) 1563
1977. rudis (Poey) 1563
Genus 625. Hypsypops, Gill 1564
1978. rubicundus (Girard) 1564
Genus 626. Microspathodon, Günther 1565
1979. bairdii (Gill) 1566
1980. chrysurus (Cuvier & Valenciennes) 1567
1981. niveatus (Poey) 1567
1982. dorsalis (Gill) 1568
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Genus 627. Centrolabrus, Günther 1575
1983. exoletus (Linnæus) 1576
Genus 628. Tautogolabrus, Günther 1576
1984. adspersus (Walbaum) 1577
Genus 629. Tautoga, Mitchill 1577
1985. onitis (Linnæus) 1578
Genus 630. Lachnolaimus, Cuvier & Valenciennes 1579
1986. maximus (Walbaum) 1579
Genus 631. Harpe, Lacépède 1581
1987. diplotænia, Gill 1582
1988. rufa (Linnæus) 1583
1989. eclancheri (Valenciennes) 1583
1990. pulchella (Poey) 1584
Genus 632. Decodon, Günther 1584
1991. puellaris (Poey) 1584
Genus 633. Pimelometopon, Gill 1585
1992. pulcher (Ayres) 1585
1993. darwinii (Jenyns) 1586
Genus 634. Clepticus, Cuvier 1586
1994. parræ (Bloch & Schneider) 1586
Genus 635. Iridio, Jordan & Evermann 1587
1995. radiatus (Linnæus) 1590
1996. nicholsi (Jordan & Gilbert) 1591
1997. sellifer (Gilbert) 1592
1998. semicinctus (Ayres) 1592
1999. garnoti (Cuvier & Valenciennes) 1593
2000. cyanocephalus (Bloch) 1594

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2001. maculipinna (Müller & Troschel) 1594
2002. bivittatus (Bloch) 1595
2003. dispilus (Günther) 1597
2004. kirschii, Jordan & Evermann 1598
2005. poeyi (Steindachner) 1599
2006. caudalis (Poey) 1599
2007. pictus (Poey) 1599
Genus 636. Oxyjulis, Gill 1601
2008. californicus (Günther) 1601
Genus 637. Emmeekia, Jordan & Evermann 1601
2009. venusta (Jenkins & Evermann) 1602
Genus 638. Julidio, Jordan & Evermann 1602
2010. adustus (Gilbert) 1602
2011. notospilus (Günther) 1603
Genus 639. Pseudojulis, Bleeker 1604
2012. inornatus, Gilbert 1604
2013. melanotis, Gilbert 1605
Genus 640. Chlorichthys, Swainson 1605
2014. lucasanus (Gill) 1607
2015. socorroensis (Gilbert) 1607
2016. nitidus (Günther) 1608
2017. nitidissimus (Goode) 1608
2018. steindachneri (Jordan) 1609
2019. bifasciatus (Bloch) 1609
2020. grammaticus (Gilbert) 1610
2021. virens (Gilbert) 1610
Genus 641. Doratonotus, Günther 1611
2022. megalepis, Günther 1611
Genus 642. Xyrula, Jordan 1612
2023. jessiæ (Jordan) 1612
Genus 643. Novaculichthys, Bleeker 1613
2024. rosipes (Jordan & Gilbert) 1614
2025. ventralis (Bean) 1615
2026. infirmus (Bean) 1616
2027. martinicensis (Cuvier & Valenciennes) 1616
Genus 644. Xyrichthys, Cuvier 1617
2028. mundiceps, Gill 1618
2029. psittacus (Linnæus) 1618
2030. modestus, Poey 1619
Genus 645. Iniistius, Gill 1619
2031. mundicorpus, Gill 1620
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Genus 646. Cryptotomus, Cope 1621
2032. dentiens (Poey) 1623
2033. retractus (Poey) 1623
2034. ustus (Cuvier & Valenciennes) 1624
2035. auropunctatus (Cuvier & Valenciennes) 1624
2036. beryllinus, Jordan & Swain 1625
2037. roseus, Cope 1626
Genus 647. Calotomus, Gilbert 1626
2038. xenodon, Gilbert 1626
Genus 648. Sparisoma, Swainson 1627
Subgenus Sparisoma 1630
2039. xystrodon, Jordan & Swain 1630
2040. atomarium (Poey) 1631
2041. radians (Cuvier & Valenciennes) 1631

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2042. hoplomystax (Cope) 1632
2043. niphobles, Jordan & Bollman 1633
2044. aurofrenatum (Cuvier & Valenciennes) 1634
2045. oxybrachium (Poey) 1634
2046. abildgaardi (Bloch) 1635
2047. distinctum (Poey) 1635
2048. chrysopterum (Bloch & Schneider) 1636
2049. lorito, Jordan & Swain 1637
2050. viride (Bonnaterre) 1638
Subgenus Euscarus, Jordan & Evermann 1639
2051. strigatum (Günther) 1639
2052. flavescens (Bloch & Schneider) 1639
2053. rubripinne (Cuvier & Valenciennes) 1640
2054. brachiale (Poey) 1641
2055. maschalespilos (Bleeker) 1641
2056. frondosum (Cuvier) 1642
Genus 649. Scarus, Forskål 1642
Subgenus Scarus 1645
2057. punctulatus (Cuvier & Valenciennes) 1645
2058. bollmani, Jordan & Evermann 1646
2059. tæniopterus, Desmarest 1646
2060. aracanga (Günther) 1647
2061. trispinosus, Cuvier & Valenciennes 1648
2062. cuzamilæ, Bean 1648
2063. vetula (Bloch & Schneider) 1649
2064. gnathodus, Poey 1650
Subgenus Calliodon (Gronow) Schneider 1650
2065. croicensis (Bloch) 1650
2066. evermanni, Jordan 1651
2067. flavomarginatus, Cuvier & Valenciennes 1652
2068. acutus, Poey 1652
2069. cæruleus (Bloch) 1652
2070. emblematicus, Jordan & Rutter 1654
Genus 650. Pseudoscarus, Bleeker 1655
Subgenus Pseudoscarus 1655
2071. cœlestinus (Cuvier & Valenciennes) 1655
2072. simplex, Poey 1656
2073. pleianus (Poey) 1656
Subgenus Loro, Jordan & Evermann 1657
2074. guacamaia (Cuvier) 1657
2075. perrico (Jordan & Gilbert) 1658
Group Zeoidea 1659
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Genus 651. Zenopsis, Gill 1660
2076. ocellatus (Storer) 1660
Genus 652. Zenion, Jordan & Evermann 1661
2077. hololepis (Goode & Bean) 1661
Genus 653. Oreosoma, Cuvier & Valenciennes 1662
2078. atlanticum, Cuvier & Valenciennes 1662
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Genus 654. Antigonia, Lowe 1664
2079. capros, Lowe 1665
SUBORDER SQUAMIPINNES 1665
Family CLXIV. Ephippidæ 1666
Genus 655. Chætodipterus, Lacépède 1667

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2080. faber (Broussonet) ... 1668
2081. zonatus (Girard) ... 1668
Genus 656. Parapsettus, Steindachner ... 1669
2082. panamensis, Steindachner ... 1669
Family CLXV. Chætodontidæ ... 1669
Genus 657. Prognathodes, Gill ... 1671
2083. aculeatus (Poey) ... 1671
Genus 658. Forcipiger, Jordan & McGregor ... 1671
2084. flavissimus, Jordan & McGregor ... 1671
Genus 659. Chætodon (Artedi) Linnæus ... 1672
Subgenus Chætodontops, Bleeker ... 1673
2085. nigrirostris (Gill) ... 1673
2086. ocellatus, Bloch ... 1674
2087. humeralis, Günther ... 1674
2088. sedentarius, Poey ... 1675
2089. aya, Jordan ... 1675
2090. atæniatus (Poey) ... 1676
2091. striatus, Linnæus ... 1677
Subgenus Chætodon ... 1677
2092. capistratus, Linnæus ... 1677
2093. bricei, Smith ... 1678
Genus 660. Pomacanthus, Lacépède ... 1679
Subgenus Pomacanthus ... 1679
2094. arcuatus (Linnæus) ... 1679
2095. paru (Bloch) ... 1680
Subgenus Pomacanthodes, Gill ... 1681
2096. zonipectus (Gill) ... 1681
Genus 661. Holacanthus, Lacépède ... 1682
2097. passer, Valenciennes ... 1682
2098. clarionensis, Gilbert ... 1683
2099. tricolor (Bloch) ... 1684
Genus 662. Angelichthys, Jordan & Evermann ... 1684
2100. ciliaris (Linnæus) ... 1684
2101. isabelita, Jordan & Rutter ... 1685
2102. iodocus, Jordan & Rutter ... 1686
Family CLXVI. Zanclidæ ... 1687
Genus 663. Zanclus, Cuvier & Valenciennes ... 1687
2103. cornutus (Linnæus) ... 1687
Family CLXVII. Teuthididæ ... 1688
Genus 664. Teuthis, Linnæus ... 1689
2104. triostegus (Linnæus) ... 1690
2105. cæruleus (Bloch & Schneider) ... 1691
2106. hepatus, Linnæus ... 1691
2107. crestonis, Jordan & Starks ... 1692
2108. bahianus (Castlenau) ... 1693
2109. aliala (Lesson) ... 1693
Genus 665. Xesurus, Jordan & Evermann ... 1694
2110. punctatus (Gill) ... 1694
2111. clarionis, Gilbert & Starks ... 1695
2112. laticlavius (Valenciennes) ... 1695
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Genus 666. Hollardia, Poey ... 1697
2113. hollardi, Poey ... 1698
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Genus 667. Balistes (Artedi) Linnæus 1699
Subgenus Capriscus, Rafinesque 1700
2114. polylepis, Steindachner 1700
2115. naufragium, Jordan & Starks 1700
2116. carolinensis, Gmelin 1701
2117. forcipatus, Gmelin 1702
Subgenus Balistes 1703
2118. vetula, Linnæus 1703
Genus 668. Pachynathus, Swainson 1703
2119. capistratus (Shaw) 1704
Genus 669. Canthidermis, Swainson 1705
2120. sobaco, Poey 1705
2121. sufflamen (Mitchill) 1706
2122. maculatus (Bloch) 1706
2123. willughbeii (Lay & Bennett) 1707
Genus 670. Xanthichthys, Kaup 1708
2124. ringens (Linnæus) 1709
2125. mento (Jordan & Gilbert) 1710
Genus 671. Melichthys, Swainson 1711
2126. piceus (Poey) 1711
2127. bispinosus, Gilbert 1711
Family CLXX. Monacanthidæ 1712
Genus 672. Cantherines, Swainson 1713
2128. pullus (Ranzani) 1713
2129. carolæ, Jordan & McGregor 1713
Genus 673. Monacanthus, Cuvier 1714
2130. ciliatus (Mitchill) 1714
2131. hispidus (Linnæus) 1715
2132. spilonotus, Cope 1716
2133. oppositus, Poey 1716
Genus 674. Pseudomonacanthus, Bleeker 1717
2134. amphioxys (Cope) 1717
Genus 675. Alutera, Cuvier 1717
Subgenus Ceratacanthus, Gill 1718
2135. schœpfii (Walbaum) 1718
2136. punctata, Agassiz 1718
Subgenus Osbeckia, Jordan & Evermann 1719
2137. scripta (Osbeck) 1719
Subgenus Alutera 1720
2138. monoceros (Osbeck) 1720
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Genus 676. Lactophrys, Swainson 1721
Subgenus Rhinesomus, Swainson 1722
2139. triqueter (Linnæus) 1722
Subgenus Chapinus, Jordan & Evermann 1723
2140. bicaudalis (Linnæus) 1723
Subgenus Lactophrys 1723
2141. trigonus (Linnæus) 1723
Subgenus Acanthostracion, Bleeker 1724
2142. tricornis (Linnæus) 1724
SUBORDER GYMNODONTES 1726
Family CLXXII. Tetraodontidæ 1726
Genus 677. Lagocephalus, Swainson 1727
2143. lævigatus (Linnæus) 1728
2144. pachycephalus (Ranzani) 1728

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Genus 678. Spheroides, Lacépède 1729
Subgenus Spheroides 1731
2145. angusticeps (Jenyns) 1731
2146. lobatus (Steindachner) 1731
2147. spengleri (Bloch) 1732
2148. maculatus (Bloch & Schneider) 1733
2149. marmoratus (Ranzani) 1733
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2150. testudineus (Linnæus) 1734
2151. annulatus (Jenyns) 1735
2151*a*. politus (Girard) 1736
2152. formosus (Günther) 1736
2153. furthi (Steindachner) 1737
2154. trichocephalus (Cope) 1737
2155. pachygaster (Müller & Troschel) 1738
Genus 679. Ovoides, Lacépède 1738
2156. erethizon (Jordan & Gilbert) 1739
2157. setosus (Rosa Smith) 1739
Genus 680. Colomesus, Gill 1740
2158. psittacus (Bloch & Schneider) 1740
Family CLXXIII. Canthigasteridæ 1740
Genus 681. Canthigaster, Swainson 1741
2159. punctatissimus (Günther) 1741
2160. rostratus (Bloch) 1741
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Genus 682. Trichodiodon, Bleeker 1743
2161. pilosus (Mitchill) 1743
Genus 683. Diodon, Linnæus 1744
2162. hystrix, Linnæus 1745
2163. holacanthus, Linnæus 1746
2164. maculifer, Kaup 1747
Genus 684. Chilomycterus, Bibron 1747
Subgenus Cyclichthys, Kaup 1748
2165. schœpfi (Walbaum) 1748
2166. spinosus, Linnæus 1749
2167. antillarum, Jordan & Rutter 1749
2168. antennatus (Cuvier) 1750
Subgenus Chilomycterus 1750
2169. atinga (Linnæus) 1750
2170. californiensis, Eigenmann 1751
Genus 685. Lyosphæra, Evermann & Kendall 1751
2171. globosa, Evermann & Kendall 1751
Family CLXXV. Molidæ 1752
Genus 686. Mola, Cuvier 1753
2172. mola (Linnæus) 1753
Genus 687. Ranzania, Nardo 1755
2173. truncata (Retzius) 1755
SUBORDER LORICATI 1756
Family CLXXVI. Scorpænidæ 1758
Genus 688. Sebastes, Cuvier 1760
2174. marinus (Linnæus) 1760
Genus 689. Sebastolobus, Gill 1761
2175. alascanus, Bean 1761
2176. altivelis, Gilbert 1763
Genus 690. Sebastodes, Gill 1765
Subgenus Emmelas, Jordan & Evermann 1777

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2177. glaucus (Hilgendorf) ... 1777
Subgenus Sebastodes ... 1778
2178. jordani, Gilbert ... 1778
2179. goodei, Eigenmann & Eigenmann ... 1779
2180. paucispinis (Ayres) ... 1780
Subgenus Sebastosomus, Gill ... 1781
2181. flavidus (Ayres) ... 1781
2182. serranoides, Eigenmann & Eigenmann ... 1782
2183. melanops (Girard) ... 1782
Subgenus Primospina, Eigenmann & Beeson ... 1783
2184. ciliatus (Tilesius) ... 1783
2185. mystinus, Jordan & Gilbert ... 1784
Subgenus Acutomentum, Eigenmann & Beeson ... 1785
2186. entomelas (Jordan & Gilbert) ... 1785
2187. rufus, Eigenmann & Eigenmann ... 1786
2188. macdonaldi (Eigenmann & Beeson) ... 1786
2189. brevispinis (Bean) ... 1787
2190. ovalis (Ayres) ... 1788
2191. eigenmanni, Cramer ... 1789
2192. hopkinsi, Cramer ... 1789
2193. alutus (Gilbert) ... 1790
2194. proriger (Jordan & Gilbert) ... 1792
Subgenus Rosicola, Jordan & Evermann ... 1793
2195. pinniger (Gill) ... 1793
2196. miniatus (Jordan & Gilbert) ... 1794
Subgenus Zalopyr, Jordan & Evermann ... 1795
2197. aleutianus, Jordan & Evermann ... 1795
2198. atrorubens, Gilbert ... 1796
2199. atrovirens (Jordan & Gilbert) ... 1797
Subgenus Eosebastes, Jordan & Evermann ... 1798
2200. saxicola (Gilbert) ... 1798
2201. crameri, Jordan ... 1799
2202. semicinctus, Gilbert ... 1800
2203. diploproa (Gilbert) ... 1801
2204. aurora (Gilbert) ... 1802
2205. melanostomus, Eigenmann & Eigenmann ... 1803
2206. introniger (Gilbert) ... 1803
Subgenus Sebastomus, Gill ... 1805
2207. ruberrimus, Cramer ... 1805
2208. constellatus (Jordan & Gilbert) ... 1806
2209. umbrosus (Jordan & Gilbert) ... 1807
2210. rosaceus (Girard) ... 1808
2211. ayresii, Gilbert & Cramer ... 1808
2212. rhodochloris (Jordan & Gilbert) ... 1809
2213. eos, Eigenmann & Eigenmann ... 1810
2214. gilli, Eigenmann & Eigenmann ... 1811
2215. chlorostictus (Jordan & Gilbert) ... 1811
2216. rupestris (Gilbert) ... 1812
Subgenus Hispaniscus, Cramer ... 1813
2217. sinensis (Gilbert) ... 1813
2218. zacentrus (Gilbert) ... 1814
2219. elongatus (Ayres) ... 1815
2220. levis (Eigenmann & Eigenmann) ... 1816
2221. rubrivinctus (Jordan & Gilbert) ... 1817
Subgenus Auctospina, Eigenmann & Beeson ... 1817
2222. auriculatus (Girard) ... 1817

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2222*a*. dallii (Eigenmann & Beeson) ... 1818
Subgenus Pteropodus, Eigenmann & Beeson ... 1819
2223. rastrelliger (Jordan & Gilbert) ... 1819
2224. caurinus (Richardson) ... 1820
2225. vexillaris (Jordan & Gilbert) ... 1821
2226. maliger (Jordan & Gilbert) ... 1822
2227. gilberti, Cramer ... 1823
2228. carnatus (Jordan & Gilbert) ... 1824
2229. chrysomelas (Jordan & Gilbert) ... 1825
2230. nebulosus (Ayres) ... 1826
Subgenus Sebastichthys, Gill ... 1827
2231. serriceps (Jordan & Gilbert) ... 1827
2232. nigrocinctus (Ayres) ... 1827
Genus 691. Sebastopis, Gill ... 1835
2233. xyris, Jordan & Gilbert ... 1835
Genus 692. Helicolenus, Goode & Bean ... 1836
2234. dactylopterus (De la Roche) ... 1837
2235. maderensis, Goode & Bean ... 1837
Genus 693. Scorpæna (Artedi) Linnæus ... 1839
2236. agassizii, Goode & Bean ... 1840
2237. cristulata, Goode & Bean ... 1841
2238. brasiliensis, Cuvier & Valenciennes ... 1842
2239. histrio, Jenyns ... 1843
2240. pannosa, Cramer ... 1845
2241. guttata, Girard ... 1847
2242. plumieri, Bloch ... 1848
2243. mystes, Jordan & Starks ... 1849
2244. grandicornis, Cuvier & Valenciennes ... 1850
2245. russula, Jordan & Bollman ... 1851
2246. sonoræ, Jenkins & Evermann ... 1852
2247. inermis, Cuvier & Valenciennes ... 1853
Genus 694. Pontinus, Poey ... 1854
2248. macrolepis, Goode & Bean ... 1855
2249. castor, Poey ... 1856
2250. pollux, Poey ... 1857
2251. rathbuni, Goode & Bean ... 1857
2252. longispinis, Goode & Bean ... 1858
2253. sierra (Gilbert) ... 1859
Genus 695. Setarches, Johnson ... 1860
2254. parmatus, Goode ... 1860
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Genus 696. Anoplopoma, Ayres ... 1861
2255. fimbria (Pallas) ... 1862
Genus 697. Erilepis, Gill ... 1862
2256. zonifer (Lockington) ... 1863
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Genus 698. Pleurogrammus, Gill ... 1864
2257. monopterygius (Pallas) ... 1864
Genus 699. Hexagrammos (Steller) Tilesius ... 1866
2258. decagrammus (Pallas) ... 1867
2259. octogrammus (Pallas) ... 1869
2260. stelleri, Tilesius ... 1871
2261. superciliosus (Pallas) ... 1872
2262. lagocephalus (Pallas) ... 1873
Genus 700. Ophiodon, Girard ... 1875
2263. elongatus, Girard ... 1875

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- 2264. latipinnis, Girard 1876
- 2265. frenatus, Eigenmann 1877

Genus 702. Oxylebius, Gill 1878
- 2266. pictus, Gill 1878

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Genus 703. Jordania, Starks 1884
- 2267. zonope, Starks 1884

Genus 704. Paricelinus, Eigenmann & Eigenmann 1885
- 2268. hopliticus, Eigenmann & Eigenmann 1886

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- 2269. thoburni (Gilbert) 1887

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- 2271. pugetensis (Steindachner) 1890

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- 2282. plumarius, Jordan & Gilbert 1900

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Artediellus atlanticus, Jordan & Evermann	1906
Radulinus boleoides, Gilbert	1919
Stelgistrum, Jordan & Gilbert	1921
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THE FISHES

OF

NORTH AND MIDDLE AMERICA.

BY DAVID STARR JORDAN AND BARTON WARREN EVERMANN.

PART II.

Class PISCES—Continued.

Subclass TELEOSTOMI—Continued.

Order ACANTHOPTERI—Continued.

Group PERCOIDEA—Continued.

SPARIFORM PERCOIDS

(With sheathing maxillary and developed axillary ventral scales.)

Family CXLIX. LUTIANIDÆ.

(THE SNAPPERS.)

Body oblong or more or less elevated, covered with moderate-sized adherent scales, which are more or less strongly ctenoid or almost cycloid.* Lateral line well developed, concurrent with the back, not extending on the caudal fin. Head large, the crests on the skull usually largely developed. No suborbital stay; mouth moderate or large, usually terminal, low and horizontal. Premaxillaries moderately protractile, their spines not extending to the occiput; maxillary long, without supplemental bone, for most of its length slipping under the edge of the preorbital, which forms a more or less distinct sheath, its form essentially as in the *Serranidæ*; teeth various, unequal and sharp, never incisor-like, some of them sometimes molar; vomer and palatines usually with villiform teeth, these

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*This account of this family and the other allies of the *Sparidæ* is based on a preliminary review of the *Sparidæ* by Jordan & Fesler, in Report U. S. Fish Commission 1889 to 1891, published in 1893, 421 to 544, plates 28–62.

sometimes molar, sometimes very small, sometimes wanting; lower pharyngeals separate; gills 4, a slit behind the fourth; pseudobranchiæ large; gill rakers moderate or long, slender; gill membranes separate, free from the isthmus. Preopercle serrate or entire; opercles without spines; sides of head usually scaly. Dorsal fin single, continuous, or deeply notched, sometimes divided into two fins, the spines usually strong, depressible in a groove, the spines heteracanthous, that is, alternating, the one stronger on the right side, the other on the left, the spines 10 to 12 in number. Anal fin similar to soft dorsal and with three spines; ventral fins thoracic, the rays I, 5, with a more or less distinct scalelike appendage at base; caudal fin usually more or less concave behind. Air-bladder present, usually simple. Intestinal canal short. Pyloric cœca few. Vertebræ usually $10+14=24$. No distinct tubercles from the cranium for the articulation of the epipharyngeal bones; enlarged apophyses for the articulation of palatine and preorbital bones; anterior 4 vertebræ without parapophyses. The family comprises about 20 genera and some 250 species, chiefly inhabiting the shores of warm regions. All of them are valued as food, and all are active, carnivorous, and voracious. The group is closely related to the *Serranidæ* on the one hand, and to the *Hæmulidæ* on the other. (*Percidæ*, part, genera *Mesoprion*, *Etelis*, etc., Günther, Cat., I; *Hoplopagrinæ*, *Lutianinæ*, *Denticinæ*, and *Xenichthyinæ*, Jordan & Fesler, *l. c.*, 431–459.)

HOPLOPAGRINÆ:

a. Vomer with teeth.

b. Nostrils remote from each other, the anterior tubular, near the end of the snout; vomerine teeth coarse, molar; teeth in jaws large, the lateral teeth molar; (skull as in *Lutianinæ*).

c. Vomer with about 3 coarse molar teeth; dorsal spines 10; scales large; gillrakers few; no teeth on palatines or on tongue; lower pharyngeals narrow, with small, conical teeth. HOPLOPAGRUS, 523.

bb. Nostrils near together, placed just before eye, the anterior not tubular; vomerine teeth villiform, the patch ∧, ⩚, or ◇-shaped; teeth in jaws all acute; no incisors or molars.

d. Palatines with teeth; teeth in jaws strong, more or less unequal.

LUTIANINÆ:

e. Interorbital area not flat nor separated from the occipital region, the median and lateral crests procurrent on it, and the frontal narrowed forward; dorsal fin continuous, the spines not separated by a notch from the soft rays.

f. Prefrontals with the articular facets arising from diverging V-shaped ridges; basi-sphenoid with an anterior lobiform extension; soft dorsal, and anal scaly; dorsal spines 10 or 11 (in American species); tongue with teeth (at least in adult examples).

g. Fronto-occipital crest ceasing anteriorily far from front of frontal; prefrontal with posterior areas impressed, long, and cribriform; no pterygoid teeth; caudal fin lunate; gill rakers rather few, shortish.

h. Top of head scaled; parietal crest confluent anteriorly with the fronto-occipital crest; preopercle with a deep notch, into which a projection from the interopercle fits, this character most marked in the adult. EVOPLITES, 524.

hh. Top of head naked; an oblique band of scales on each side of nape; parietal crest not confluent with the fronto-occipital crest, either fading away anteriorly or running into the ocular rim; preopercle with a shallow notch or emargination only.
NEOMÆNIS, 525.

gg. Fronto-occipital crest continued forward along top of head to nearly opposite nostrils; prefrontals with the posterior area short, excavated above and in front.

i. Gill rakers short and few, about 12; anal fin long and low, its rays III, 10 or 11. RABIRUBIA, 526.

ii. Gill rakers long and numerous, about 25; anal rather high, its rays III, 9; pterygoid teeth present (in the adult) in a narrow band; caudal fin very deeply forked. OCYURUS, 527.

ff. Prefrontals with the articular facets developed from simple tubercles and not V-shaped; basisphenoid not lobigerous; canines small; soft rays of dorsal 10 or 11.

j. Prefrontals with the posterior areas cribriform; pterygoids with a broad patch of teeth (in adult); hyoid bones and tongue with teeth; canines very small or obsolete; dorsal spines 12 (or 13); soft dorsal and anal somewhat scaled; top of head scaled to before middle of eye; gill rakers numerous. RHOMBOPLITES, 528.

jj. Prefrontals with the posterior areas solid and somewhat tumid; pterygoids, hyoid bone, and tongue toothless; dorsal spines 10; soft dorsal and anal scaleless.
APSILUS, 529.

ETELINÆ:

ee. Interorbital area flat, separated by a transverse line of demarcation from the occipital, by which the median as well as the lateral crests are limited; frontals wide in front; tongue and pterygoids toothless; soft rays of dorsal 10 or 11.

k. Dorsal fin continuous; frontals not cavernous; supraorbital margin crenate; periotic region much swollen outward and with the bones thin and polished; preorbital moderate; frontals behind with funnel-shaped foraminæ; soft dorsal and anal scaleless; last rays of dorsal and anal produced.
APRION, 530.

kk. Dorsal nearly or quite divided into two fins by a deep notch; eyes very large; preorbital very narrow.

l. Frontals not cavernous, simply normally perforate; supraorbital margins crenate; periotic region little convex and with the bones thick, unpolished; prefrontals behind with funnel-shaped foramina; body comparatively elongate; head naked above and on snout; soft dorsal and anal naked; peritoneum and lining of gill cavity pale; caudal deeply forked; color crimson.
ETELIS, 531.

ll. Frontals cavernous (like those of *Sciænoids*), with longitudinal, osseous bars, leaving interspaces in front of transverse ridge and on each side near the front; supraorbital margins smooth; prefrontals behind with simple foramina for olfactory nerves; body comparatively short and deep; head scaly above and on jaws and snout; soft dorsal and anal scaly at base; peritoneum and lining of gill cavity black; caudal lunate. Deep-water species, blackish-purple in color.
VERILUS, 532.

Xenichthyinæ:

dd. Palatines without teeth; vomer with minute teeth in a ◇-shaped patch; teeth in jaws very small, equal. Body compressed, covered with small, thin, ctenoid, silvery scales; top of head, cheeks, opercles, part of preorbital and crown scaly; mouth small, oblique, with small recurved teeth in jaws; preorbital narrow, a rhomboid patch of small teeth on vomer; few teeth or none on the tongue; gill rakers long and slender; dorsal fins nearly separate, the anterior of slender spines, the soft rays scaly. Intestinal canal short (the pyloric cœca not examined). Skull with the crests conspicuous, the temporal running forward to join the supraoccipital.

m. Dorsal rays X or XI-I, 12 to 14, the spinous part of the fin at least half longer than soft part; anal rays III, 10 or 11.

n. Dorsal fins entirely separated, interval between them $\frac{4}{5}$ diameter of eye; spinous dorsal half longer than soft; nostrils small, close together. Xenocys, 533.

nn. Dorsal fins connected at base, the spinous part about double length of soft part. Xenistius, 534.

mm. Dorsal rays XI-I, 18 or 19, the soft part longer than the spinous part; anal rays about III, 18. Xenichthys, 535.

Denticinæ:

aa. Vomer and palatines toothless; one or both jaws with strong canines; no molars; preopercle entire; dorsal continuous.

o. Dorsal spines 10; scales large, 50 in lateral line, those on cheeks in 3 rows; mouth moderate, the jaws subequal; fins usually with filaments. Nemipterus, 536.

523. HOPLOPAGRUS, Gill.

Hoplopagrus, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 253 (*guntheri*).

Anterior nostril remote from the other, close to the premaxillary, in the end of the barbel or tube; vomer with about 3 coarse molar teeth; teeth of jaws coarse and blunt, the lateral teeth molar; scales large; gill-rakers few; dorsal spines continuous with the soft rays which are scaly at the base; lower pharyngeals narrow, with small conical teeth; skull and general anatomy essentially as in *Lutianus* and *Neomænis*.

Only one species of this remarkable generic type is known. With a close resemblance in nearly all respects to *Neomænis apodus* and other typical species, it differs strikingly from all other fishes of this type in the structure of the nostrils and in the dentition. (ὅπλον, armor; πάγρος, porgy.)

1628. HOPLOPAGRUS GUNTHERI, Gill.

(Pargo.)

Head $2\frac{3}{4}$; depth $2\frac{1}{5}$ to $2\frac{1}{2}$; eye $4\frac{1}{3}$ (in young); snout $2\frac{2}{5}$. D. X, 14; A. III, 9. Scales 6-47-16. Pectoral $1\frac{1}{3}$ in head, reaching to first anal spine; anal $1\frac{1}{2}$; longest soft dorsal ray equals longest anal ray. Body oblong-ovate, short, deep, and compressed, the back arched, the body abruptly contracted to the base of the short caudal peduncle; anterior profile slightly and evenly convex. Snout rather long and pointed; mouth small, the maxillary scarcely reaching to front of orbit, its length $2\frac{3}{4}$ to 3 in head; teeth in jaws arranged as in *Lutianus*, but coarse and blunt, the lateral teeth of both jaws rounded and molarlike, more blunt in large examples; upper jaw with about 2 coarse, rather long canines; vomer with about 3 to 5 coarse molar teeth; palatines and tongue toothless; lower jaw rather weak, included; anterior nostril at the extreme front of the snout, close to the premaxillary, in the extremity of a barbel-like tube which hangs down above the mouth and is nearly as long as the eye; posterior nostril a rather long and narrow oblique slit, near the front of the eye; eye small, near the middle of the length of the head; interorbital space rather broad and convex, its width 4⅓ in head; preorbital broad, its least width 3½ to 4⅓ in head; vertical limb of preopercle oblique, sharply serrate, the teeth rather fine above, coarse at the angle; emargination of preopercle sharp and deep, more conspicuous than in most species of *Lutianus*, the knob of interopercle conspicuous. Gill rakers few and short, about 7 developed on lower part of anterior arch, besides several rudiments; opercle without spinous projections; scapular scale serrate. Temporal crest of skull very short, coalescing with the orbital rim. Scales rather small, regularly arranged, those above lateral line in series which are throughout parallel with the lateral line, those below in horizontal series; temporal region with a band of one or two series of large scales; cheeks with about 7 rows of scales; top of head naked. Dorsal spines rather low and strong, the fin somewhat deeply emarginate; soft dorsal and anal high, angular, and pointed in outline, the middle rays elevated, the last ray not ⅖ the height of the middle ones, which are 2 in head; pectoral long and falcate; caudal short, feebly lunate, the upper lobe 1¾ in head; anal high and pointed, the middle rays reaching base of caudal, a little more than half length of head; anal spines strong, the second longer and stronger than third, 2¾ in head; pectoral long, 3 in body; ventral 1½. Color greenish above, belly coppery pink; head olive, sides with 8 cross-bands of warm brown, unequally placed; fins dusky olive, shaded with pinkish and brown; a round dusky blotch near base of last rays of soft dorsal; the pectorals pale, a dark crescent at base; ventrals black-tipped; top of head with some small dark spots. Adult nearly plain olivaceous, coppery below. Pacific coast of tropical America, from Guaymas to Panama. This remarkable species is a common food-fish at Mazatlan, where it is known as the "*pargo*." The specimens examined by us are from Mazatlan and Guaymas. (Named for Dr. Albert Günther "in token of appreciation.")

Hoplopagrus guntheri, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 253, Cape San Lucas (Coll. Xantus); STEINDACHNER, Ichth. Beiträge, VI, 1, 1878; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 429; JORDAN & FESLER, *l. c.*, 432; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 145; JORDAN, Fishes Sinaloa, in Proc. Cal. Ac. Sci., Ser. 2, V, 1895, 454.

524. EVOPLITES, Gill.

Evoplites, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 236 (*pomacanthus*=young of *kasmira*).

This genus is very close to *Lutianus* and *Genyoroge*, two sections and genera not represented in American waters. It agrees with *Lutianus* in having the whole top of the head from the eyes backward covered with scales. This region is naked in *Genyoroge*, which, like *Evoplites*, has the preopercle marked by a deep gash or incision in which a knob from the interopercle finds place. The latter character is subject to considerable variation in *Genyoroge* and may not be of generic value. In *Evoplites* the parietal crest is confluent anteriorly with the supraoccipital crest, a character not seen in any species of *Neomænis*. *Lutianus* and *Genyoroge* have not been examined in this respect. Species brightly colored, chiefly of the western Pacific; one within our limits. (εὐ, well; ὁπλίτης, armed.)

1629. EVOPLITES VIRIDIS (Valenciennes).

Head 2⅔; depth 3; eye large, 4 in head. D. X, 14; A. III, 8. Scales 9–54–17. Body rather elongate, profile to nape nearly straight; snout pointed, 3¼ in head; supraoccipital crest low; preorbital moderate, 6⅔ in head; mouth moderate, the jaws subequal, the maxillary reaching front of pupil, 2⅔ in head; each jaw with a narrow band of villiform teeth, outside of which are moderate canines; tongue toothless; vomer with a Λ-shaped band of teeth and with no backward prolongation on median line. Gill-rakers short and slender, 10 developed; nostrils small, well separated, the posterior oblong. Preopercle with a sharp, deep notch, into which fits a knob from the interopercle; temporal crest not confluent with orbital rim, but nearly or quite confluent with supraoccipital crest in front; lower limb of preopercle coarsely serrate; preopercle strongly serrate above the notch. Scales rather small, the rows above lateral line very oblique, nowhere parallel with the lateral line, 7 or 8 rows on cheeks, anterior largest, one row on interopercle; top of head scaled as far forward as front of pupil; 10 rows of scales between eye and suprascapula; soft dorsal and anal scaly. Dorsal spines low and strong, the fourth spine longest, 3 in head; soft dorsal rounded, the longest ray 4½ in head; anal moderate, its free edge straight, the second spine longest, 2⅔ in head; pectorals long, 1⅕ in head. Color golden-brown with 5 sky-blue longitudinal stripes, each broadly and sharply margined with dark blue; the whole band as broad anteriorly as the interspaces, growing narrower behind the dark-blue border, nearly as wide on each side as the median pale-blue band; a faint median blue streak from occiput to front of dorsal, then a band of 3 blue streaks, as above stated, from occiput above eye to ninth dorsal spine; second from upper edge of eye to middle of soft dorsal; third from middle of eye to last ray of dorsal; fourth from upper jaw along lower edge of eye to middle of base of caudal peduncle, where it ends abruptly; fifth from end of maxillary to above last ray of anal; fins all pale, the dorsal partly edged with black; no black lateral spot. Rocky islands of the eastern Pacific; known from the Galapagos (Valenciennes), Tres Marias (Forrer), and the Revillagigedos Islands (Gilbert); here described from a specimen* taken by Alfonse Forrer at the Tres Marias. (*viridis*, green, a very inappropriate name, as the species is olive with blue stripes.)

Diacope viridis, VALENCIENNES, Voyage de la Vénus, 303, pl. 1, fig. 2 (very bad), 1845, Galapagos Islands.

Genyoroge viridis, GÜNTHER, Cat., I, 180, 1859.

Lutjanus viridis, JORDAN, Proc. U. S. Nat. Mus. 1888, 330; JORDAN & FESLER, *l. c.*, 439.

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* *Evoplites kasmira* (from Swatow, China) differs from *Evoplites viridis* in the following respects: Body deeper (depth 2⅔): scales smaller (8) 12–62–22; the back more elevated and the profile steeper; snout 3 in head; preorbital 6; maxillary 2⅗; second anal spine 3⅕; lower lateral band wanting; a vague dark lateral blotch present, larger than eye; bands less sharply defined than in *E. viridis*, the pale-blne median streak in each band twice as wide as the dark border, the whole band narrower, its width one-third to one-fourth that of the golden-brown interspaces; no median dorsal streak.

525. NEOMÆNIS, Girard.

(SNAPPERS.)

Neomœnis, GIRARD, U. S. Mex. Bound. Survey, Zool., Fishes, 18, 1859 (*emarginatus*=*griseus*).
Raizero, JORDAN & FESLER, Rept. U. S. Fish Comm. 1889 (1893), 438 (*aratus*).

Body oblong, compressed, the back somewhat elevated; head long, naked above, except for a broad oblique band of scales at the nape; nostrils normally close together, neither with a tube; mouth large, the jaws with bands of villiform teeth, besides which is usually an outer series of larger teeth in each jaw, and 2 to 4 stronger teeth or canines in front of upper jaw; vomer with villiform teeth; villiform teeth on the palatines; usually one or more patches of teeth on the tongue in the adult; no molar teeth; no teeth on pterygoids; preopercle without notch or with a shallow emargination; posterior limb of preopercle finely serrate; gill rakers rather few, shortish; soft rays of dorsal and anal scaly at base; dorsal spines 10 (rarely 11), continuous with the soft rays; caudal lunate or forked; anal rays 7 to 9. Interorbital area not flat nor separated from the occipital region, the median and lateral crests procurrent on it, and the frontal narrowed forward; fronto-occipital crest ceasing anteriorly far from front of frontal, usually behind eye; prefrontal with posterior areas impressed, long and cribriform; parietal crest not confluent with orbital rim, but nearly or quite joined anteriorly to fronto-occipital crest (in species examined); prefrontals with the articular facets arising from diverging V-shaped ridges; basisphenoid with an anterior lobiform extension. Vertebræ $10+14=24$. We venture to separate the American Pargos or Snappers from the Old World genus *Lutianus* on the following characters, distinctive so far as known: Parietal crest usually confluent anteriorly with the orbital rim, never joined anteriorly to the fronto-occipital crest; top of head naked; a more or less isolated band of scales extending obliquely on each side of nape; notch on preopercle for the reception of knob of interopercle shallow and broad, sometimes obsolete, otherwise essentially as in *Lutianus*.* Species very numerous, chiefly

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* The true relations of *Neomœnis*, *Lutianus*, *Genyoroge*, *Evoplites*, and *Proamblys* are yet to be determined. It seems to us that none of our species is congeneric with *Lutianus lutianus*, the type of *Lutianus*, while *Evoplites* differs materially from the type of *Genyoroge*. A full study of the skeletons must, however, be made before these genera can be placed on a sound basis. The following is the synonymy of the Asiatic groups:

LUTIANUS, Bloch.

Lutianus, BLOCH, Ichthyologia, IV, 107, 1790 (*lutianus*); the name first spelled *Lutianus*, but later changed, on the plates and elsewhere, to *Lutjanus*. It is from *Ikan lutjang*, the Malayan name of *Lutianus lutianus*.
Mesoprion, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 441, 1828 (*lutianus*, etc.).
? *Hypoplites*, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 236 (*retrospinis*).

GENYOROGE, Cantor.

Diacope, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 410, 1828 (*sebæ*); name preoccupied in *Lepidoptera*.
Genyoroge, CANTOR, Malayan Fishes, 12, 1850 (*sebæ*); substitute for *Diacope*.

PROAMBLYS, Gill.

Proamblys, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 236 (*nigra*=*macolor*).
Macolor, BLEEKER, Poiss. Amboina, Nederl. Tidskr. Dierk., 277, 1867 (*macolor*).

American and African; active, predatory fishes highly valued as food. (*νέος*, new; *Mænis*, a genus remotely related and not resembling the present one.)

NEOMÆNIS :

I. Dorsal spines 10 in American species; rows of scales above lateral line 5 to 10 in number.

A. Vomerine patch of teeth diamond-shaped; scales large, those above the lateral line fully parallel with it; dorsal rays X, 14; canines small; gill rakers about 7. Color dark purplish-olive, scales with silvery spots. JORDANI, 1630.

AA. Vomerine patch of teeth ⋀-shaped, or ∧-shaped, not diamond-shaped.

a. Soft dorsal normally with 14 rays, rarely with 13.

b. Anal fin rounded, its middle rays less than half length of head; no black lateral spot.

c. Developed gill rakers 7 to 9, usually with few rudiments, if any; preorbital deep; caudal lunate. Shallow-water species, olivaceous in color, more or less marked by cross-bands when young, often with a blue streak along the preorbital.

d. Vomerine teeth forming a ∧- or ⋀-shaped patch, the backward prolongation on median line very short or wanting; scales above lateral line in oblique series, which are not throughout parallel with it; body comparatively elongate, the depth 3 to $3\frac{1}{2}$ in length; upper and lower canines very strong, lower considerably stronger than in other species; mouth very large; vertical fins dusky; size very large.

e. Maxillary $2\frac{3}{7}$ in head; preorbital $5\frac{1}{2}$ in head; maxillary reaching nearly or quite to middle of eye, $2\frac{1}{2}$ to $2\frac{3}{5}$ in head; base of pectoral dusky; head $2\frac{7}{8}$ in length; depth $3\frac{2}{5}$. D. X, 14; A. III, 8; scales 6–48–13. NOVEMFASCIATUS, 1631.

ee. Maxillary $2\frac{2}{7}$ in head; preorbital $4\frac{3}{4}$ in head; maxillary reaching past middle of eye, about $2\frac{1}{3}$ in head; usually a black spot or shade at base of pectoral; head $2\frac{3}{4}$; depth 3; D. X, 14; A. III, 8; scales 7–50–12. CYANOPTERUS, 1632.

dd. Vomerine teeth forming an anchor-shaped patch, with a distinct backward prolongation on the median line; second anal spine little, if any, shorter than third; upper canines strong, lower moderate or small.

f. Scales above lateral line arranged in series which are not throughout parallel with lateral line, being oblique and irregular, at least below the second dorsal.

g. Body comparatively elongate, the depth $2\frac{3}{4}$ to 3 in length; snout rather pointed; mouth large, maxillary $2\frac{1}{2}$ in head; scales 7 in an oblique series between dorsal and lateral line; pectoral short, not $\frac{2}{3}$ length of head; soft dorsal, anal, and caudal blackish, tinged with wine color, always becoming dusky in spirits; body dark greenish, more or less reddish below; blue streak on preorbital disappearing early; specimens from deep water with more or less red. Head $2\frac{3}{4}$; depth $2\frac{7}{8}$. D. X, 14; A. III, 8; scales 7–50–12. GRISEUS, 1633.

gg. Body comparatively deep, depth about $2\frac{1}{2}$ in length; snout long and pointed; mouth rather small, maxillary about 3 in head; pectorals long, more than $\frac{2}{3}$ length of head; soft dorsal, anal, and caudal orange or yellow, becoming pale in spirits.

h. Scales moderate, about nine in an oblique series from first dorsal to lateral line, about 55 vertical series above lateral line between gill opening and base of caudal; lateral line with more than 45 pores; a whitish area below eye; blue streak along suborbital region usually not disappearing with age; head $2\frac{1}{2}$; depth $2\frac{4}{7}$. D. X, 14; A. III, 8; scales 8–56–15. JOCU, 1634.

hh. Scales unusually large, 5 or 6 in an oblique series from first dorsal to lateral line, about 45 vertical series above lateral line between gill opening and base of caudal; lateral line with less than 40 pores; blue streak on suborbital region not permanent; head $2\frac{1}{2}$; depth $2\frac{1}{2}$. D. X, 14; A. III, 8; scales 6–44–13. APODUS, 1635.

ff. Scales above lateral line in horizontal series which are throughout more or less distinctly parallel with the lateral line; snout long and pointed, 3 in head; pectoral fin long, $1\frac{1}{4}$ in head; color brownish-red with faint silvery streaks along rows of scales on sides, a pale-blue streak along suborbital and preorbital; fins yellow. Head $2\frac{3}{5}$; depth $2\frac{3}{5}$; D. X, 14; A. III, 8; scales 5–45–12. ARGENTIVENTRIS, 1636.

cc. Developed gill rakers more numerous, about 10, with several rudiments before them (in *N. buccanella;* not examined in *N. lutjanoides*).

i. Caudal deeply forked; mouth small, maxillary reaching posterior nostril; preopercle slightly notched, little serrate; canines strong; tongue with teeth; soft dorsal and anal rounded; pectoral pointed, $4\frac{1}{2}$ in total length. Color brownish-green, with 6 brown cross-bands; a broad greenish stripe from opercle to base of caudal. D. X, 14; A. III, 8. (Hybrid, probably of *chrysurus + jocu.*) LUTJANOIDES, 1637.

ii. Caudal moderately forked; mouth large, maxillary reaching anterior edge of eye, $2\frac{3}{5}$ in head; preopercle serrate, the serræ strong on angle; canines medium; vomerine teeth in an anchor-shaped patch; eye large; the base and axil of pectoral with a jet-black blotch; scales moderate, about 8 oblique series from the lateral line to the first dorsal spine, about 63 vertical rows above lateral line; second anal spine long, about $2\frac{2}{3}$ in head. Color crimson; caudal peduncle and caudal fin largely yellow; iris orange-red; no lateral blotch. Head $2\frac{1}{2}$; depth $2\frac{4}{5}$; D. X, 14; A. III, 8; scales 8–63–15. BUCCANELLA, 1638.

bb. Anal fin angulated, its median rays produced, the longest in adult at least half head; body rather robust; upper canines rather long; lower small. Color more or less red, the young with a black lateral blotch.

j. Scales above the lateral line arranged in series which are not throughout parallel with it; side with a black blotch, which usually disappears with age; anal fin bright red.

k. Teeth on vomer in an anchor-shaped patch, with a median backward prolongation; lingual teeth well developed; snout rather pointed; maxillary reaching edge of pupil, $2\frac{1}{2}$ in head; caudal edged with black.

l. Iris golden-yellow in life. Scales rather small, 9–52–10, about 50 pores in the lateral line; body rather slender, the depth $2\frac{1}{2}$ in length; second anal spine about $3\frac{1}{2}$ in head; gill rakers 9 below angle; eye large, $4\frac{3}{4}$ in head in adult; preorbital $5\frac{3}{4}$ in head. Head $2\frac{2}{3}$ in length; D. X, 14; A, III, 9. Color bright rose-red, with golden streaks.
VIVANUS, 1639.

ll. Iris rose-red. Scales rather large, 8–46–14; body robust, the depth $2\frac{3}{5}$ in length; second anal spine about 4 in head; gill rakers about 8 below angle; eye moderate, $5\frac{1}{2}$ to 6 in head in adult; preorbital 5. Head $2\frac{3}{5}$; D. X, 14; A. III, 9. Color rose-red, nearly uniform; size large. AYA, 1640.

kk. Teeth in vomer in a ∧-shaped patch, without distinct prolongation on the median line; lingual teeth very few or none; snout rather pointed; maxillary reaching edge of eye, $2\frac{5}{7}$ in head; scales rather small, about 50 pores in lateral line. Color, greenish above, rosy below; a small but distinct lateral blotch; young with oblique blue streaks above; fins mostly brick-red, especially the anal; a pearly streak below eye. Head $2\frac{2}{3}$; depth $2\frac{2}{3}$; D. X, 14; A, III, 8; scales 10–67–17. ANALIS, 1641.

jj. Scales above the lateral line arranged in series which are more or less distinctly parallel throughout with the lateral line; no black lateral blotch; scales rather large, 5 or 6 between first dorsal spine and lateral line; lateral line with 47 pores; vomerine teeth in a ∧-shaped patch; lingual teeth well developed; maxillary reaching front of pupil, $2\frac{3}{4}$ in head. Color red, dusky above; a blue streak on suborbital; anal and ventral fins dusky. Head $2\frac{3}{4}$; depth 3; D. X, 14; A. III, 7; scales 5–47–11.
COLORADO, 1642.

aa. Soft dorsal with 12 rays (rarely 13); body oblong, the back not greatly elevated; upper canines moderate, lower small or obsolete; scales above lateral line in very oblique series; anal fin low, its outline rounded.

m. Mouth moderate; maxillary $2\frac{3}{5}$ to $2\frac{3}{4}$ in head.

n. Caudal not deeply forked; gill rakers rather few (8 or 9 besides rudiments).

o. Pectoral short, $1\frac{2}{3}$ in head; teeth on vomer in an anchor-shaped patch. Color olivaceous, no black lateral blotch; lower jaw included. Head $2\frac{3}{4}$; depth 3; D. X, 12; A. III, 8; scales 8–51– X. (Hybrid, *griseus* + *synagris?*) **BRACHYPTERUS, 1643.**

oo. Pectoral long, more than two-thirds length of head; color chiefly red; a large black lateral blotch; lower jaw slightly projecting.

p. Vomerine teeth in an anchor-shaped patch, with a distinct backward prolongation on median line. Color red; back and sides with rows of dark bluish-gray spots following the series of scales; similar spots on sides of head; fins reddish. Head $2\frac{3}{4}$; depth $2\frac{3}{4}$; D. X, 12; A. III, 8; scales 7–53–15. GUTTATUS, 1644.

pp. Vomerine teeth in a ∧- or ⩚-shaped patch, the prolongation on median line very short or wanting. Color rosy greenish above, sides of head and body with numerous longitudinal stripes of golden yellow; soft dorsal and caudal red; lower fins yellow. Head $2\frac{3}{5}$; depth $2\frac{4}{5}$; D. X, 12; A. III, 8; scales 8–60–15. SYNAGRIS, 1645.

nn. Caudal deeply forked; the gill rakers rather numerous, about 10 on lower part of the anterior arch; teeth on vomer in an anchor-shaped patch; body rather elongate, compressed; lower jaw projecting or not; eyes small; scales small; the lateral line with about 50 pores; anal spines graduated. Color reddish, with horizontal yellow streaks; no black lateral blotch. Head 3; depth 3; D. X, 13; A. III, 9; scales 9–53–15. (Hybrid, *synagris* + *chrysurus?*) AMBIGUUS, 1646.

mm. Mouth large; maxillary $2\frac{2}{5}$ in head; teeth on vomer in an anchor-shaped patch; lower jaw strongly projecting; body rather elongate, strongly compressed; eye very large, red; scales rather small, the lateral line with about 50 pores; caudal little forked; second and third anal spines subequal. Color dark brown; pale below, flushed with red; fins mostly red; a large black lateral blotch. Head $2\frac{1}{2}$; depth $2\frac{4}{5}$; D. X, 12; A. III, 8; scales 9–62–14. MAHOGONI, 1647.

RAIZERO:*

II. Dorsal spines 11; scales large, those above lateral line in 4 or 5 series, fully parallel with lateral line.

q. Soft dorsal and anal low; vomerine teeth in a ∧-shaped patch; teeth on tongue; gill rakers few. Color dark, olive-reddish below; distinct silvery streaks along rows of scales; young with silvery bars; lower fins dusky. Head 3; depth $3\frac{1}{3}$; D. XI, 12; A. III, 7; scales $4\frac{1}{2}$–45–12. ARATUS, 1648.

Subgenus NEOMÆNIS.

1630. NEOMÆNIS JORDANI, Gilbert.

Head $2\frac{3}{4}$ to 3 in length; depth $2\frac{3}{5}$ to $2\frac{3}{4}$; eye $4\frac{1}{2}$ in head. D. X, 14; A. III, 9; scales $5\frac{1}{2}$ above lateral line, 43 to 47 oblique series running downward and backward. Body deep, with regular curves, the two profiles nearly equal. Snout short, with rapidly rising upper profile, $3\frac{1}{3}$ to $3\frac{1}{5}$ in head. Eye large, much greater than the width of the preorbital at the middle of its length, where it is $\frac{1}{7}$ length of head. Maxillary reaching slightly beyond front of pupil, its length equaling that of snout and half eye, $2\frac{2}{5}$

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* Spanish name of *Neomænis aratus*, from *raiz*, root; "place of roots," the species living among the roots of the mangroves.

in head. Mandibular teeth in a villiform band which is of moderate width anteriorly and tapers rapidly on sides; an outer series of distantly placed moderate canines; teeth in premaxillaries similar to those below, the canines small, a pair on each side enlarged, but small for this genus; vomerine teeth in a diamond-shaped patch, the sides subequal, concave; preocular margin with a rather deep emargination above the angle; above the emargination the edge is very minutely and finely serrulate, at the angle provided with a few short slender rather distant spines. Gill rakers strong, those above angle all short, the one at angle abruptly lengthened, about half diameter of eye; seven developed on horizontal limb of arch. Posterior nostril elliptical. Five or six series of scales on cheeks, the band running upward to level of upper margin of orbit; a single narrow band of scales on occiput, separated by a naked space from those on nape; top of head, snout, mandible, preopercle, maxillary, and anterior half of interopercle naked; scales above lateral line in series parallel with the lateral line; scales on the breast not much reduced, as large as those on opercle; basal portions of dorsal and anal densely scaled, the scales forming a sheath at base; basal ¾ of caudal densely scaled. Dorsal spines heavy, not flexible, the longest 2½ in head; second and third anal spines about equal, half the length of snout and eye; soft dorsal and anal low, rounded, the longest ray (measured from free edge of sheath) about ⅓ head; caudal lunate, the middle rays ¾ the outer, 1⅗ in head; pectorals very long, nearly reaching vertical from vent, 1¼ in head; ventrals 1⅘ in head. Color, back and top of head deep olive; lower half of sides and below dark reddish-purple; many of the scales on sides with a silvery spot near the margin, producing faint lengthwise stripes; fins reddish-purple, the basal portion of soft dorsal and caudal tinged with olive; iris silvery, with inner and outer orange circle; no blue lines on the head; inner lining of gill membranes and the shoulder girdle largely orange-red; pectoral fins orange-brown. Of rare occurrence at Panama, but occasionally taken in considerable numbers. It is a small species, reaching a length of about 17 inches. A strongly marked species, quite unlike any other. (Named for David Starr Jordan.)

Neomænis jordani, GILBERT, Fishes of Panama, in Proc. Cal. Ac. Sci. 1897, Panama. (Coll. Gilbert. Type, No. 11988, L. S. Jr. Univ. Mus.)

1631. NEOMÆNIS NOVEMFASCIATUS (Gill).

(PARGO PRIETO; PARGO MAREÑO; PARGO NEGRO.)

Head 2⅔; depth 3; eye 5⅗ to 4⅗ in head. D. X, 14; A. III, 8, rarely III, 7; maxillary $2\frac{3}{7}$; preorbital 5½; scales 6-48-13. Body comparatively elongate, the back little elevated; profile very gently curved; snout long and pointed, ⅓ length of head; eye small, less than breadth of the wide preorbital; maxillary barely reaching to opposite front of orbit, its length 2⅗ in head; each jaw with a very narrow band of villiform teeth, outside of which is a single series of larger teeth, those in sides of upper jaw small, 2 in front, however, developed as large fanglike canines, larger than usual in this genus, their length about equal to the diameter of the pupil; a pair of smaller canines near the middle of the upper jaw, between the large ones; conical teeth of lower jaw distant, caninelike, 6 to 8 in number on each side, larger than in any of our other species of *Neomænis*, much larger than those on sides of upper jaw; teeth on tongue in a large oval patch, in front of which are two smaller patches; teeth on vomer forming a crescent-shaped patch, without backward prolongation on the median line. Gill rakers few, not very large, distant, about 1 + 7. Preopercle with its posterior margin extending very obliquely forward, the angle therefore very obtusely rounded; a broad shallow notch above the angle, the margin above the notch convex, its edge minutely serrulate; a few coarser teeth at the angle; lower border mostly smooth. In the adult the whole margin of the preopercle is without serrations; suprascapular serrate. Posterior nostril nearly round; a single narrow band of scales extending downward and backward from occiput. Dorsal spines rather long, with sharp flexible tips, the fourth the longest, but shorter than the snout, 3⅓ in head; anal spines short and strong, much stronger than dorsal spines, the second and third of nearly equal length, the second somewhat strongest, not much longer than diameter of the orbit, 4⅔ in head; soft rays of anal low, 3¼ in head; caudal fin emarginate, 1⅗ in head; pectorals much longer than ventrals, extending slightly beyond them, their length 1⅖ in head. Scales moderate, firm, present on cheek, opercle, subopercle, and in a single series on interopercle; scales above lateral line forming very oblique series running upward and backward, not parallel with the lateral line; scales on breast not very small, smaller than those on opercle; basal portions of vertical fins scaly. Coloration: Back and sides very dark olive-brown, the back with a slaty tinge, the sides often with some faint purplish; sides paler below; the belly and lower parts of head white; very old specimens largely coppery red, nearly uniform, darker above; each scale on the dorsal region with the basal half dark; head colored like the body; maxillary brownish, no bluish streak on preorbital; vertical fins dark brownish; the spinous dorsal olive-brown with a narrow dark streak at base and tip; anal with the margin of its first three rays white; pectorals olivaceous brown; ventrals dark brownish, becoming reddish at base; inside of mouth reddish-yellow. Young with the margin of spinous dorsal and most of anal black; young with 9 dark crossbands; varies much with age. Generally common; known from Pacific coast of tropical America; Cape San Lucas; Guaymas; Mazatlan; Punta Arenas; San Blas; Panama. A large species, valued as food; closely allied to *N. cyanopterus;* reaching a weight of 20 pounds. (*novem*, nine; *fasciatus*, banded, a character seen only in the very young.)

Lutjanus novemfasciatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 251, Cape San Lucas (very young); JORDAN & SWAIN, *l. c.*, 443; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 146; JORDAN & FESLER, *l. c.*, 440.

Mesoprion pacificus, BOCOURT, Ann. Sci. Nat. Paris 1868, 223, Tauesco, Pacific coast of Guatemala.

Lutjanus prieto, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 353, Mazatlan. (Type, No. 28196.)

Lutjanus pacificus, VAILLANT & BOCOURT, Mission Scientifique au Mexique, 123, pl. III, fig. 2, 1881.

Lutianus novemfasciatus, JORDAN, Fishes Sinaloa, 454.

NOTE.—The following description is from an adult example, 30 inches long, the so-called Pargo mareño or Maroon snapper, from Mazatlan: Head 3; depth 3 (3⅓ in young). D. X, 14; A. III, 18; scales 6 (4)–50–13; eye 6½ in head; snout 2½; maxillary 2⅗; pectoral 1¼; ventral 2; anal 3; third anal spine 5¾; caudal 1¾; preorbital 3⅚ (4⅓ in smaller specimens 20 inches long; 5 .in those of 1 foot long). Body very robust, not much compressed, the back not sharp. Head very large; the mouth very large, reaching middle of eye. Canines very strong, in front of jaw and on sides of lower; vomerine teeth in a V-shaped patch, not prolonged behind. Gill rakers 7, very small, the longest less than pupil. Posterior nostril oblong, much longer than anterior. Preopercle slightly notched; 7 or 8 rows of scales on cheek. Dorsal deeply notched, rather low; soft dorsal low and rounded; anal low and rounded; pectoral long and pointed; caudal short, scarcely concave; anal spines short, graduated. Scales above lateral line not in a parallel series. Maroon color above, copper-red below, becoming salmon color anteriorly; fins blackish, tinged with maroon; pectoral dull yellow olive, blackish at tip; a blackish cross spot on base of pectoral, growing faint with age. Inside of the mouth salmon; ventral quite dark, the tips black; iris salmon color; no blue spots or line below eye. Young with spinous dorsal edged with black; anal and caudal black; ventrals black tipped; a black crescent on upper part of base of pectoral. Young 1 foot long, black with progressively less red and narrow preorbital; color largely blackish, tinged with copper on belly and lower parts. The young are called Pargo negro; the half-grown, Pargo prieto; the adult, Pargo mareño, or Maroon snapper. This species reaches a much larger size than any other member of the genus on the Pacific coast, those specimens obtained by us with dynamite among the Venados Islands having a weight of about 25 pounds. It is a food-fish of some importance. It undergoes very considerable changes with age, as the notes above show. The young are dark in color, the bodies banded, and the amount of red very slight. The adult becomes uniformly colored with much red, and with increased age there is a progressive lengthening of the snout and widening of the preorbital.

1632. NEOMÆNIS CYANOPTERUS* (Cuvier & Valenciennes).

(CUBERA.)

Head 2¾; depth 3; eye rather small, 5⅔ in head. D. X, 14; A. III, 8; scales (6) 7–50–12; 50 pores. Body elongate, rather robust, the back little elevated; profile from snout to nape nearly straight; snout long, thick, rather acute in profile, 3 in head; interorbital space flattish or gently convex, 6¼ in head; occipital keel low; preorbital broad, 4⅔ in head; mouth very large; maxillary reaching middle of eye, 2⅓ in head. Canine teeth larger than in any other species, especially those in lower jaw; upper jaw with a narrow band of villiform teeth, outside of which is a series of strong sharp teeth; 4 canines in front, 2 of them very long and strong, their lengths ⅔ diameter of eye; lower jaw with 5 or 6 very strong caninelike teeth on each side, the largest little smaller than the canines of upper jaw; a few villiform teeth in front of jaw; tongue with a large oblanceolate patch of teeth, pointed behind, its length about twice its greatest width; vomer with a Λ-shaped patch of teeth, usually without backward prolongation on median line, but sometimes with a short median prolongation (⩚-shaped), its length always less than the width of the patch in front; pterygoid and hyoid bones without teeth. Gill rakers rather short and thick, about ⅓ length of diameter of eye, about 8 on lower arch; no rudiments. Preopercle with posterior margin nearly vertical, the emargination broad and shallow; preopercle finely serrate above the teeth, coarser just above the angle; lower limb almost entire. Scales rather large, loosely attached; cheeks with about 8 rows, 1 row on interopercle, 1 row on subopercle, and about 7 on opercle; temporal region with about two rows of large scales; tubes of lateral line simple; base of soft dorsal and anal scaly. Dorsal spines rather strong, the outline of the fin gently convex, the fourth spine longest, 3¼ in head; the tenth spine, 6 in head; anal spines strong, the second spine stronger, slightly shorter than third, which is 5 in head; caudal little forked; pectorals about 1⅗ in head. Color dusky-gray, paler below, the belly sometimes tinged with reddish; membranes of dorsal, anal, and caudal grayish-black, the anal and soft dorsal especially blackish; ventrals blackish at tip; pectorals plain olivaceous, the base and inner margin dusky; head dusky above, without markings. Length 2 to 4 feet; length of specimen described (from Cuba) 17½ inches. West Indies to Brazil, rather common; a large coarse fish regarded as unwholesome by fishermen. (*κυάνεος*, blue; *πτερόν*, fin.)

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* This species is common in the markets of Havana, where it is known as Cubera. It grows to a very considerable size, and specimens of less than 5 pounds weight are very rare in the markets. A specimen from Carthagena, United States of Colombia, is in the museum at Cambridge. The species seems to have an indifferent reputation as a food-fish, being often unwholesome. It has always a ragged appearance in the market, its scales being less firmly attached than those of other species. This species is very closely related to *N. griseus*, but so far as we have seen the two may always be distinguished by the difference in form of the vomerine patch of teeth and by the development of the canines of the lower jaw. These are larger in *N. cyanopterus* than in any other American species. This species is almost identical with *N. novemfasciatus* of the Pacific coast, the somewhat larger mouth being the most marked point of difference. The dusky area or spot at base of pectoral is more distinct in the Atlantic form. *L. dentatus* of Duméril and *M. cyanopterus* of Cuvier and Valenciennes are identical with *L. cubera*, Poey. This is shown by the examination of the original types. *M. pargus*, Cuvier and Valenciennes, is probably the same.

Mesoprion cyanopterus, Cuvier & Valenciennes, Hist. Nat. Poiss., II, 472, 1828, Brazil.
? *Mesoprion pargus*, Cuvier & Valenciennes, Hist. Nat. Poiss., II, 473, 1828, Puerto Rico.
Lutjanus cubera, Poey, Ann. Lyc. Nat. Hist. N. Y. 1871, 75, Cuba; Poey, Enumeratio, 27, 1875; Jordan & Swain, *l. c.*, 442.
Lutjanus dentatus, A. Duméril in Vaillant & Bocourt, Miss. Sci. au Mex., 125, 1881, Brazil.
Lutjanus cynodon, Poey, Synopsis, 294, 1868.
Mesoprion cynodon, Poey, Repertorio, II, 268, 1868; not of Cuvier & Valenciennes.
Lutjanus cyanopterus, Jordan, Proc. U. S. Nat. Mus. 1886, 534 (examination of type); Jordan & Fesler, *l. c.*, 440.

1633. NEOMÆNIS GRISEUS (Linnæus).

(Gray Snapper; Mangrove Snapper; Cabellerote; Lawyer.)

Head 2¾; depth 2⅞ to 3¼. D. X, 14; A. III, 8; scales (6) 7-50-12; 47 pores. Body comparatively elongate, the back not strongly compressed, little elevated; profile almost straight from snout to nape, thence gently convex. Snout rather pointed, 3 in head. Eye rather small, 4⅔ in head. Interorbital space gently convex, 6 in head; occipital keel little prominent; preorbital rather broad, 5½ to 6½ in head. Mouth large; jaws subequal; maxillary reaching front of pupil, 2⅗ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged teeth; 4 canines in front of upper jaw, 2 of them quite large—⅓ diameter of eye; lower jaw with a very narrow band of villiform teeth in front of jaw only; outside of these a single row of teeth larger than outer teeth of upper jaw, becoming caninelike in adult; tongue with an oval patch of teeth, its width about ½ its length; vomer with an arrow-shaped patch of teeth, with backward prolongation on the median line, its length about twice its width in front. Gill rakers rather short and thick, their length about $\frac{1}{3}$ diameter of eye, about 8 on lower arch, with no rudimentary ones before them. Preopercle with its posterior margin nearly vertical, with a rather broad and deep emargination. Preopercle finely serrate above, the teeth coarser at the angle. Scales comparatively large, the rows in horizontal series below the lateral line, those above running parallel with the lateral line until below the soft dorsal, where they become slightly irregular and oblique; 7 rows of scales on cheek; an embedded row on interopercle; 1 row on subopercle, and 7 on opercle; temporal region with about 3 rows of large scales; top of head, snout, and jaws naked; base of soft dorsal and anal scaly; tubes of lateral line branched. Dorsal spines rather strong, the outline of the fin gently convex, the fourth spine longest, $2\frac{1}{2}$ in head, the tenth spine 4 in head; margin of soft dorsal rounded, the ninth and tenth rays longest, $1\frac{1}{3}$ length of first, and $1\frac{3}{5}$ last ray, $2\frac{1}{2}$ in head; caudal emarginate, the upper lobe longest, $1\frac{1}{3}$ length of middle rays, which are $1\frac{3}{4}$ in head; anal fin high, its margin slightly angulate, the middle rays longest, 2 times length of last ray, $2\frac{1}{6}$ in head, first ray reaching almost to tip of last ray, when the fin is depressed; second anal spine as long or slightly longer and stronger than third, $3\frac{1}{4}$ to 4 in head; ventrals $1\frac{3}{4}$ in head; pectorals shortish, scarcely reaching vent, $1\frac{4}{7}$ in head. Color in life, very dark green above, the middle part of each scale brassy-black, its edge broadly pearly whitish; below lateral line the duskiness of the middle of the scale passes into brassy, and below into bright coppery, the belly and lower parts of head being more or less distinctly bright coppery-red; the lower jaw grayish; no blue stripe below eye, except in the very young; top of head blackish-olive; dorsal blackish, its margin darker and tinged with maroon-red; soft dorsal dusky, anteriorly slightly edged with whitish; caudal violaceous or maroon black; anal wine-color, edged with whitish; pectorals pale flesh-color; ventrals whitish, faintly marked with reddish. Young with a blackish band from snout through eye to nape, very distinct in life; a blue streak below eye; spinous dorsal with a dark maroon-colored band along edge. Described from a specimen from Key West, 11 inches in length. Fishes from deep water are much redder than those taken near the shore. In no case is the caudal yellowish or of any pale shade. West Indies; ranging from New Jersey to Brazil. This species is very common along our South Atlantic and Gulf coasts and occasionally strays northward as far as Woods Hole, being the northernmost in its range of any member of the genus in the Atlantic. It is everywhere generally known as gray snapper. In Florida and the Bahamas, where the coasts are lined by mangrove bushes among which the young of this species abound, the name mangrove snapper comes into use. It inhabits water of varying depths, large specimens being often found very near the shore, while others may be taken in waters of considerable depth in company with *Neomænis aya.* These latter individuals are much redder than those found in shoal water; their general color is paler and the body is a trifle less elongate. Such correspond to the form named *Lutianus stearnsi.* (*griseus*, gray.)

Turdus pinnis branchialibus carens (Mangrove snapper), CATESBY, Hist. Carolina, pl. 9, 1743, Bahamas.

Caballerote, PARRA, Descr. Dif. Piezas, Hist. Nat., pl. 25, fig. 1, 1787, Havana.

Labrus griseus, LINNÆUS, Syst. Nat., X, 283, 1758; after CATESBY.

Sparus tetracanthus, BLOCH, Ichth., pl. 279, 1791, Martinique; on a drawing by PLUMIER.

Anthias caballerote, BLOCH & SCHNEIDER, Syst. Ichth., 310, 1801, Cuba; after PARRA.

Bodianus vivanet, LACÉPÈDE, Hist. Nat. Poiss., IV, pl. 4, fig. 3, 1803, Martinique; on a drawing by PLUMIER.

Mesoprion griseus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 469, 1828, San Domingo; not after LINNÆUS.

Lobotes emarginatus, BAIRD & GIRARD, 9th Smith. Rept., 332, 1855, Beesley Point, New Jersey.

Lutjanus stearnsi, GOODE & BEAN, Proc. U. S. Nat. Mus. 1878, 179, Pensacola, Florida. (Type, No. 21337, U. S. N. M. Coll. Silas Stearns.)

Mesoprion caballerote, POEY, Repertorio, II, 157, 1868.

Lutjanus caballerote, POEY, Synopsis, 293, 1868; POEY, Enumeratio, 26, 1875; JORDAN & GILBERT, Synopsis, 921, 1883.

Lutjanus griseus, JORDAN & SWAIN, *l. c.*, 439; JORDAN & FESLER, *l. c.*, 441.

1634. NEOMÆNIS JOCU (Bloch & Schneider).

(DOG SNAPPER; JOCÚ.)

Head $2\frac{1}{2}$; depth $2\frac{4}{7}$. D. X, 14; A. III, 8; scales (7) 8–56–15, 45 pores. Body comparatively deep and compressed, the back elevated; profile steep and almost straight from snout to nape, thence little convex; snout rather long and pointed, $2\frac{2}{3}$ in head; eye moderate, $4\frac{5}{7}$ in head; interorbital space narrow, gently convex, $5\frac{2}{3}$ in head; occipital keel moderate; preorbital broad, $4\frac{1}{3}$ in head; mouth rather large; jaws subequal; maxillary reaching front of orbit, $2\frac{3}{5}$ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth; 4 canines in front of upper jaw, 2 of them very large, almost equaling in length the diameter of pupil; lower jaw with a narrow villiform band in front only, and a series of larger teeth outside, the largest on the side of the jaw almost caninelike; tongue with a single large oval patch of teeth, its length more than twice its width; teeth on vomer forming a broadly arrow-shaped patch with a backward prolongation on median line twice the length of width of anterior part. Gill rakers rather short and thick, the longest about $\frac{1}{4}$ diameter of eye, about 9 on lower part of arch, with no rudiments in front of them. Preopercle with its posterior margin slanting obliquely downward and forward, the emargination very broad and shallow; preopercle finely serrate above, the teeth coarser at the angle, which is not salient. Scales moderate, smaller than in *N. griseus* or *N. apodus*, in nearly horizontal series below, and obliquely upward and backward above the lateral line; about 7 or 8 rows of scales on the cheek; 1 row on interopercle, 1 on subopercle, and 7 on opercle; about 3 rows of large scales on the temporal region; top of head, snout, and jaws naked; tubes of lateral line branched; bases of soft dorsal and anal scaly; dorsal spines rather strong, the outline of the fin evenly curved, the fourth and fifth spines longest, $2\frac{3}{5}$ in head; the tenth spine 4 in head; margin of soft dorsal convex, the middle rays longest, $2\frac{5}{6}$ in head; caudal little forked, upper lobe the longer, 1⅖ length of middle rays, 1⅗ in head; margin of anal well rounded, the middle rays about twice length of last ray; the first ray reaching nearly to tip of last ray when the fin is depressed; pectorals slightly falcate, reaching almost to front of anal, 1⅓ in head; anal spines strong, the second rather longest and strongest, not always reaching past tip of third, 3⅖ in head. Color of adult in life, olivaceous above, paler below, much flushed, so that the general hue is everywhere coppery-red; sides of body with numerous narrow crossbars, rather faint, the light and dark of about equal width, or the pale narrower; scales of upper parts mesially bronzed; head coppery, especially above; a broad whitish area from eye to angle of mouth, becoming rosy in spirits; an irregular line of small round or oblong spots below eye, from snout to angle of opercle; soft fins all plain light brick-red, the anal somewhat orange, the caudal more or less yellowish; spinous dorsal with a light orange band at base and edge, the middle pearly; the blue stripe below eye persists longer than in any of the other species which possess it. Young, in life, greenish-olive, the head and breast flushed with bright coppery-red; base of each scale bright orange-yellow, this color more extensive than the dark ground color, so that the general hue of the body, especially below and posteriorly, is a rich golden-yellow; a dusky spot on top of head; temporal region with a dusky shade; an undulating blue stripe below eye from snout to angle of opercle; a similar fainter streak below it; pectorals pale red or light orange; ventrals orange; other fins rich golden yellow, the front of the anal and the edge of the spinous dorsal rich, clear, bright orange. Described from a specimen 12 inches in length. West Indies, north to Florida Keys, south to Bahia; occasionally north to Woods Hole, Mass. This species is about equally abundant with *N. apodus* about Florida Keys and Cuba. (From Cuban name *jocú*.)

Jocú, PARRA, Descr. Dif. Piezas, Hist. Nat., I, pl. 25, fig. 2, 1787, Cuba.

Anthias jocu, BLOCH & SCHNEIDER, Syst. Ichth., 310, 1801, Cuba; after PARRA.

Mesoprion litura, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 467, 1828, Cayenne; St. Thomas.

Mesoprion jocu, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 466, 1828.

Lutjanus jocu, POEY, Synopsis, 292, 1868; JORDAN & SWAIN, *l. c.*, 437; JORDAN & FESLER, *l. c.*, 443.

1635. NEOMÆNIS APODUS (Walbaum).

(SCHOOLMASTER; CAJÍ.)

Head 2½; depth 2½. D. X, 14; A. III, 8; scales (5) 6–42 to 45–13, 36 pores in lateral line. Body comparatively deep, moderately compressed, the back considerably elevated; profile almost straight from snout to nape, the nuchal region rather convex; snout unusually long and pointed, its outline before eye a little depressed, its length $2\frac{5}{7}$ in head; eye moderate, 4⅓ in head; interorbital space flattish or gently convex, 5½ in head; mouth large, maxillary reaching front of orbit, 2⅗ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth; 4 canines in front of upper jaw; 1 of them on each side very large, almost as long as pupil; lower jaw with a narrow villiform band in front only, and an enlarged series outside, these largest on side of jaw, where some of them are somewhat caninelike; tongue with a single large oval patch of teeth, its length more than twice its width; teeth on vomer forming an arrow-shaped patch with backward prolongation on median line, the length of which is twice the width of the arrow-patch in front. Gill-rakers rather short and thick, the longest about ⅓ diameter of eye, about 9 on lower part of arch. Preopercle with its posterior margin directed somewhat obliquely forward, usually very weakly emarginate, finely serrate above, almost entire at the angle. Scales large, decidedly larger than in *N. jocu*; the series below the lateral line almost horizontal, those above in rows parallel with the lateral line, these becoming more or less irregular posteriorly and extending upward and backward below soft dorsal; about 7 rows of scales on the cheeks, 1 row on interopercle, 1 on subopercle, and 7 on opercle; temporal region with a few large scales in about 2 rows; base of soft dorsal and anal scaly; tubes of lateral line each with 4 or 5 branches. Dorsal spines strong, the outline of the fin not greatly convex, the fourth spine longest, 2⅔ in head, the tenth spine 4 in head; margin of soft dorsal well rounded, the middle rays longest, twice length of last, 2¾ in head; caudal not deeply forked, the upper lobe longest, 1½ length of middle rays, which are 2 in head; margin of anal well rounded, its middle rays twice length of last, 2²⁄₇ in head, the first ray reaching about to middle of last when the fin is depressed; anal spines strong, the second longer than third, 3⅓ in head; ventrals 2 in head; pectorals reaching to front of anal, 1⅓ in head. Color of young in life, greenish, with about 8 very narrow vertical paler bars on body; scales of lower part of sides with central orange spots, forming faint streaks along the rows of scales; belly pearly; head greenish; a blackish streak from snout through eye to nape; a narrow, sharply defined blue stripe below eye from snout to angle of opercle; no lateral spot; spinous dorsal edged with orange; ventrals, anal, and caudal pale orange-yellow; pectorals paler. The adult examples differ from the young in the vertical bars being fainter or obsolete, and in the absence, usually, of the blue stripe below eye and the dark stripe on temporal region; the soft dorsal, anal, and caudal are always yellow, of varying intensity, and the edge of the spinous dorsal is orange, not dusky; the whitish area below the eye, very constant in *N. jocu*, is wanting in *N. apodus*. Length of specimen described from Key West, 9 inches. West Indies; north to Key West, south to Bahia. Straying north rarely to Woods Hole. (*α*, privative; *πούς*, foot; Catesby having neglected to add pectoral fins to his rough drawing; *caxis* is the plural of the Cuban name *cají*, formerly spelled *caxí*.)

?*Perca marina pinnis branchialibus carens* (Schoolmaster), CATESBY, Hist. Carolina, etc., tab. 41, 1743, Bahamas; figure very poor, the pectoral fins omitted.

Caxis, PARRA, Descr. Dif. Piezas, Hist. Nat., pl. 8, fig. 2, 1787, Havana.

?*Perca apoda* ("FORSTER, Catal. of Anim., MS., 21," 1774; printed 1844), WALBAUM, Artedi Piscium, 351, 1792; based on the Schoolmaster of CATESBY.

Sparus caxis, BLOCH & SCHNEIDER, Ichth., 284, 1801, Havana; after PARRA.

Bodianus striatus, BLOCH & SCHNEIDER, Syst. Ichth., 335, pl. 65, 1801, West Indies; misprinted *albostriatus*, p. 237; called *B. fasciatus* on plate.

Lutjanus acutirostris, DESMAREST, Prem. Dec. Ichth., 12, pl. 3, 1823, Cuba.

Mesoprion cynodon, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 465, 1828, Martinique; San Domingo.

Mesoprion linea, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 468, 1828, Cuba; San Domingo.

Mesoprion flavescens, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 472, 1828, Martinique.

Mesoprion caxis, POEY, Repertorio, II, 269, 1868.

Lutjanus caxis, POEY, Synopsis, 293, 1868; POEY, Enumeratio, 25, 1875; JORDAN & SWAIN, *l. c.*, 435; JORDAN & FESLER, *l. c.*, 443.

1636. NEOMÆNIS ARGENTIVENTRIS (Peters).

(PARGO AMARILLO.)

Head $2\frac{3}{5}$; depth $2\frac{3}{5}$. D. X, 14; A. III, 8; scales 5–45–12; 45 pores. Body formed as in *N. apodus,* moderately compressed, the back considerably elevated; profile straight or slightly concave from snout to nape; the nuchal region rather convex; snout long and pointed, anteriorly somewhat depressed, its length 3 in head; eye moderate, $4\frac{1}{3}$ in head; interorbital space very gently convex, its width $6\frac{1}{2}$ in head; mouth large, maxillary reaching a little past front of orbit, its length 3 in head; upper jaw with two strong canines in front, rather weaker than in *N. apodus;* lower jaw with the teeth in the outer series enlarged, some of the lateral teeth largest, but scarcely caninelike; teeth on tongue in a single large, oblong patch; teeth on vomer forming an arrow-shaped patch, with a long backward prolongation on the median line. Gill rakers rather few and short, about 7 on lower part of anterior arch, these not preceded by rudiments. Preopercle with its posterior margin extending downward and forward, very weakly emarginate, finely serrate above, almost entire at the angle. Scales large, much as in *N. apodus,* the series above the lateral line almost horizontal, and throughout parallel with the lateral line; scales below lateral line anteriorly in series running somewhat upward and backward; posteriorly in horizontal series; 6 rows of scales on the cheek; a band of about 3 series of rather large scales on the temporal region; soft dorsal and anal scaly; tubes of lateral line each with 4 or 5 branches. Dorsal spines strong, the longest $2\frac{5}{6}$ in head; margin of soft dorsal well rounded, the middle rays 3 in head; caudal not deeply forked, the upper lobe $1\frac{3}{7}$ in head; anal fin rather high, somewhat rounded, the longest rays $2\frac{1}{6}$ in head; anal spines strong, the second stronger and larger than third, $3\frac{2}{3}$ in head; ventrals 2 in head; pectorals reaching about to front of anal, $1\frac{1}{4}$ in head. Color in spirits, brownish above, paler below; each scale of sides somewhat silvery near its middle, these forming narrow and rather distinct dull silvery streaks which follow the direction of the rows of scales; a bluish horizontal streak below eye, most distinct in young examples; fins pale; back olivaceous, anterior parts washed with maroon-red, bright on sides of head, becoming more orange posteriorly; posterior half of body bright yellow; some pale streaks on scales; pectorals light orange-red; other fins mostly bright yellow; a row of round blue spots below eye; belly silvery, slightly washed with red; inside of mouth white; iris white. The above description is from a specimen from Mazatlan 11 inches in length. Length 2 feet. Pacific coast of tropical America, generally common on the Pacific coast of Mexico and Central America. It bears considerable resemblance to *N. apodus, jocu,* and *griseus,* but is distinct from all these. (*argentum,* silver; *venter,* belly.)

Mesoprion argentiventris, PETERS, Berlin. Monatsber., 704, 1869, Mazatlan.
Lutjanus argentiventris, JORDAN & SWAIN, *l. c.*, 434; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 146; JORDAN & FESLER, *l. c.*, 444.
Lutianus argentiventris, JORDAN, Fishes Sinaloa, 455.

1637. NEOMÆNIS LUTJANOIDES (Poey).

This species is known only from Poey's description. Its describer has suggested the possibility of its being a hybrid between *Ocyurus chrysurus* and *Neomœnis apodus.* The following is Poey's original description:

> The fish, if not undoubtedly belonging to the genus *Ocyurus* of Professor Gill, of which the *Mesoprion chrysurus* is the type, comes nearer to it than to any other genus, by the bifurcation of its caudal deeper than in *Lutjanus jocu, caxis, caballerote,* etc. The pointed snout and the long canines would bring it among these last. From its colors the fishermen are led to consider it a hybrid between the *M. chrysurus* and the *N. caxis.* They often thus dispose of a new fish, as in the case of the *Ocyurus ambiguus* and *aurovittatus.* But as such hybrids are rare among fish, and especially so among these genera, it is, I believe, right to consider the present species as a good one. The total length 290 millimeters, or 11.45 inches. The height of the body, equal to the length of the head, is contained 3⅔ times in the total length. The eye is rather high up, and half way from snout to tip of opercle. The nostrils are on the middle of the snout, rather wide apart, the posterior one oblong. The mouth is small, for the ends of the maxillaries are under the posterior nostril. The preopercle is only slightly notched, finely denticulated; the opercle without a spinous point. The teeth are in one row, the canines rather long, and behind them there are asperities; the palatine arch has teeth and the tongue is rough. The lateral line has about 55 scales, 6 rows above and 15 below it; there are scales on the opercles and temples, the rest of the head naked. The scapular bones show outside. There are very small scales on the interstitial base of the soft rays of the vertical fin. D. 10, 14; A. 3, 8. The posterior borders of the dorsal and anal are rounded. The caudal lobes are elongated, but less so than in the *M. chrysurus.* The pectoral is pointed, contained 4½ times in the total length. The three first spiny rays of the dorsal gradually increase in length, the last, or tenth one, not longer than the preceding ones. The soft rays of the dorsal and anal are all branched and flattened. The color is a brownish-green, the abdomen paler, 6 brown bands fall vertically from back over the sides; a broad and interrupted stripe of a greenish color extends from the upper part of the opercle to the base of the caudal, resembling *Ocyurus chrysurus* and *aurovittaus.* I have seen this fish but once, and I sent the specimen to the United States, either to Professor Agassiz or to Mr. Brevoort. It bears my No. 163.

Cuba; one specimen known. (*Lutjanus*; εἶδος, likeness.)

Ocyurus lutjanoides, POEY, Ann. Lyc. Nat. Hist. N. Y., IX, 1871, 319, Cuba.
Lutjanus lutjanoides, POEY, Enumeratio, 30, 1875; JORDAN & SWAIN, *l. c.*, 458; JORDAN & FESLER, *l. c.*, 445.

1638. NEOMÆNIS BUCCANELLA (Cuvier & Valenciennes).

(SESI DE LO ALTO; OREILLE NOIRE; BOUCANELLE; BLACK-FIN SNAPPER.)

Head 2½; depth 2⅘. D. X, 14; A. III, 8; scales 8–63–15, 50 pores. Body rather slender, subelliptical, the back moderately elevated; profile almost straight from snout to nape, thence convex; snout rather long and pointed, 3⅕ in head; eye large, 3½ in head. Interorbital space slightly convex, 5⅔ in head, the occipital ridge low; preorbital rather narrow, 7½ in head; mouth rather small, the jaws subequal; maxillary reaching almost to front of pupil, 2⅖ in head; upper jaw with a narrow band of villiform teeth, outside of which is a series of moderately enlarged teeth; 4 rather strong canines, 2 of them longer, about ½ diameter of pupil; lower jaw with a single series of unequal teeth as strong as upper; inside of these is a narrow band of villiform teeth in front of jaw only; tongue with a single long oval patch of teeth, its length more than twice its width; vomer with a broadly arrow-shaped patch of teeth with a backward prolongation on median line, its length scarcely greater than width of patch in front; no teeth on pterygoid or hyoid bones. Gill rakers numerous, about 12 developed on lower part of arch, besides 5 or 6 very small or rudimentary ones, those near the angle larger, their length 2¼ in eye. Preopercle with its posterior margin oblique and nearly straight, a broad and rather shallow notch above its angle, its edge strongly serrate, the teeth coarser at angle and on lower limb. Scales rather small, the rows above the lateral line running upward and backward, the rows below nearly horizontal; about 6 rows of scales on the cheeks, 1 or 2 rows on interopercle, 1 row on subopercle, 7 or 8 rows on opercle; bases of soft dorsal and anal scaly, the outline of the fins rather strongly convex; temporal region with a band of large scales, behind which are small scales; top of head, snout, and jaws naked. Dorsal spines moderately strong, the fifth spine $2\frac{4}{7}$ in head, the tenth spine 3½ in head; margin of soft dorsal nearly straight, its rays almost of equal length, 3¾ in head; caudal moderately forked, the upper lobe slightly the longer, 1⅔ length of middle rays, which are 2⅕ in head; margin of anal gently convex, the middle rays slightly longer than last, 2⅓ in head, the tip of first soft ray almost reaching tip of last ray when the fin is depressed; anal spines strong, the second longer and stronger than third spine, 2⅔ in head; ventrals 1⅘ in head; pectorals reaching opposite first soft ray of anal, 1¼ in head. Color in life crimson, silvery below, flushed with crimson; axil and base of pectorals jet-black; eye orange; dorsal crimson, its edge scarlet; caudal orange-yellow, as also part of caudal peduncle; last rays of soft dorsal, most of anal and ventrals, yellow; pectorals, base of anal, and ventral spines pinkish. In spirits the bright colors fade, leaving the body pale reddish, the base of the pectoral within and without jet-black. West Indies; a small and strongly marked species, common in the deeper waters about Havana, and known in the markets as *sesí* or *sesí de lo alto.* (*boucanelle,* a name used in Martinique.)

Mesoprion buccanella, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 455, 1828, Martinique; GÜNTHER, Cat., I, 198.

Mesoprion caudanotatus, POEY, Memorias, I, pl. 3, fig. 2, 440, 1851, Cuba.

Lutjanus buccanella, POEY, Synopsis, 295, 1868; JORDAN & SWAIN, *l. c.*, 445; JORDAN, Proc. U. S. Nat. Mus. 1889, 648; JORDAN & FESLER, *l. c.*, 445.

1639. NEOMÆNIS VIVANUS (Cuvier & Valenciennes).

(PARGO DE LO ALTO; SILK SNAPPER.)

Head 2¾; depth 3. D. X, 14; A. III, 8; scales (7) 8–72–17, 50 pores. Body rather slender, subelliptical, the back not greatly elevated; profile very slightly convex from snout to nape, thence more arched; snout rather long and pointed, 3 in head; eye rather large, 4 in head; interorbital space slightly convex, 4⅘ in head, the occipital keel not very prominent; preorbital rather broad, 5⅘ in head; mouth rather small; jaws subequal; maxillary reaching front of pupil, 2½ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of well-developed teeth; 4 moderate canines in front of jaw, the 2 longest about ½ diameter of pupil; lower jaw with a single series of rather large, unequal teeth, inside of which is a very narrow band of villiform teeth in front of jaw only; tongue with an oval patch of teeth, about twice as long as broad, in front of which is a roundish patch; no teeth on hyoid bone; ptreygoids toothless; vomer with a broadly arrow-shaped patch of teeth, with a backward prolongation on median line somewhat longer than width of the patch in front. Gill rakers slender, their length almost equal to ½ diameter of eye, about 11 developed below the angle, in front of these about 5 rudiments. Preopercle with posterior limb slanting slightly downward and forward, with a broad and rather shallow emargination, its margin finely serrate above; coarser teeth at the angle and on lower limb; posterior nostril oval. Scales very small, the rows running obliquely upward and backward above the lateral line, the rows being almost horizontal; 7 rows of scales on cheek, 2 rows on interopercle, 1½ rows on subopercle, and about 8 on opercle; temporal region with 1 row of large scales behind which are smaller ones; top of head, snout, and jaws naked; bases of soft dorsal and anal scaly. Dorsal spines rather strong, the outline of fin rather strongly convex and without deep emargination, fourth spine longest, 2⅗ in head; the tenth, 3⅗ in head; margin of soft dorsal straightish, rounded behind, the ninth ray longest, 1⅓ length of first and two times last ray, 2½ in head; caudal lunate, the upper lobe slightly longer than lower, its length 1½ times middle rays, which are 2 in head; margin of anal angulate, the middle rays longest, 2 times length of last ray, 1⅘ in head, the first ray reaching almost to tip of last ray, when the fin is depressed; ventrals 1⅔ in head; pectorals not quite reaching front of anal, 1⅕ in head; second anal spine slightly longer than third, 3¼ in head. Color in life, bright rose-color, paler below, some narrow, undulating, light golden streaks following the rows of scales above the lateral line; iris always bright yellow (an important color mark); mouth reddish within; traces of dark lateral spot in most specimens; dorsal rosy, its base pale, its edge yellow; caudal rosy, dusky behind, sometimes blood-red at tip; pectorals very pale yellow, ventrals and anal pale rosy, the latter yellowish behind. The bright colors all fade and disappear in spirits. The scales of the upper parts, in spirits, are marked with dark dots, which form streaks along the rows of scales. Described from a specimen from Cuba, 10 inches in length. West Indies. A handsome species, rather common in the markets of Havana, where it is known as the *pargo de lo alto*. When fresh it may always be known by the bright yellow color of the eye, a color which does not entirely fade in spirits. (From the French name *vivanet*, used at Martinique, probably allied to *vivax*, "lively.")

Mesoprion vivanus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 454, 1828, Martinique.
Mesoprion profundus, POEY, Memorias, II, 150, 1860, Cuba; JORDAN & SWAIN, *l. c.*, 444.

Lutjanus torridus, Cope, Trans. Am. Philos. Soc. 1869, 468, St. Kitts.

Lutjanus purpureus, Poey, Enumeratio, 29, 1875 (name taken from *Mesoprion purpureus*, Cuvier & Valenciennes, Hist. Nat. Poiss., II, 471, 1828; the name *purpureus* evidently a slip of the pen for *aya*).

Mesoprion aya, Cuvier & Valenciennes, Hist. Nat. Poiss., II, 457, 1828; Günther, Cat., I, 198, 1859.

Lutjanus profundus, Poey, Enumeratio, 28, 1875.

Lutjanus vivanus, Jordan, Proc. U. S. Nat. Mus. 1889, 648; Jordan & Fesler, *l. c.*, 445.

1640. NEOMÆNIS AYA * (Bloch).

(Red Snapper; Pargo Colorado; Pargo Guachinango; Acara Aya.)

Head 2⅗; depth 2⅗. D. X, 14; A. III, 9; scales (7) 8–60–15, pores 46. Body rather deep, moderately compressed, the back well elevated, profile steep, and almost straight from snout to nape. Snout rather pointed, 2⅘ in head; eye moderate, 5½ in head (larger in young). Interorbital space angulate or strongly convex, 5 in head; occipital keel strong; preorbital rather broad, 5 in head; mouth rather large, maxillary reaching front of orbit, 2½ in head; upper jaw with a narrow band of villiform teeth, outside of which is a row of larger but comparatively small teeth; 4 canines in front, 2 (sometimes duplicate) of them larger, their length about ⅓ diameter of eye; lower jaw with a single row of rather small teeth, usually largest on side of jaw, where some of them are almost caninelike; within these is a very narrow band of villiform teeth in front of jaw only; tongue with a broad oval patch of teeth, scarcely twice as broad as long; in front of this patch is a small irregular patch; vomer with a broadly arrow-shaped patch, with a rather short backward prolongation on median line, its length about equaling width of patch in front. Gill rakers moderate, their length about ½ diameter of eye, 8 on lower arch. Preopercle with its posterior margin about vertical, its emargination deep, its edge rather finely serrate above, coarser at the angle, dentate on the lower border. Scales rather large, the rows horizontal below lateral line, the rows above running backward and upward; 6 rows of scales on cheek, 1 on the interopercle, 1 on subopercle, and 7 on opercle; bases of soft dorsal and anal scaly; pores of lateral line branched; temporal region with a broad band of scales, with a few scattering ones below it; top of head, snout, and jaws naked. Dorsal spines rather strong, the outline of the fin moderately convex, the fourth and fifth spines longest, 2⅘ in head; the tenth spine about 4 in head; margin of soft dorsal nearly straight, the fin pointed behind; the middle rays little longer than first ray, 1½ length of last, 3 in head; caudal lunate, the upper lobe scarcely longer than lower, its length 1⅖ times length of middle rays, which are $1\frac{6}{7}$ in head; margin of anal strongly angulate, the middle rays reaching nearly to base of caudal, $2\frac{1}{2}$ length of last ray, $1\frac{4}{5}$ in head; the first ray reaches about to middle of last ray when the fin is depressed; anal spines strong, the second scarcely as long as third, 4 in head; ventrals $1\frac{4}{5}$ in head; pectorals reaching to front of anal fin, $1\frac{1}{5}$ in head. Color in life, deep rose-red, paler on throat; bluish streaks along rows of scales, above becoming fainter and disappearing with age; fins brick-red; dorsal bordered with orange, with a narrow blackish edge; caudal narrowly edged with blackish; eye red; a large blackish blotch above lateral line and below front rays of soft dorsal in young specimens, this spot disappearing with age; axil of pectoral dusky. Length 2 to $2\frac{1}{2}$ feet. Described from a specimen from off Key West, 16 inches in length. Long Island to Brazil, on rocky banks in rather deep water; especially abundant in the Gulf of Mexico off Cape San Blas and about Yucatan. The most valuable food-fish of the genus in the waters of the United States; taken in great numbers off Pensacola and Key West. On the American coast it is known everywhere as "red snapper" or to the Spaniards as *pargo colorado*. In Havana it bears the name *pargo guachinango*, "Mexican Snapper," because it is brought to that city from the Mexican coast. According to Poey it is comparatively rare in Cuban waters, although daily seen in the markets. Specimens from Rio Janeiro examined by us seem to be identical with the common red snapper. Occasionally straying north to Woods Hole. (From the Portuguese name, *Acara aya.*)

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* The type of *Mesoprion campechanus* examined by us at Havana is a stuffed skin of a young fish, apparently belonging to this species. In this specimen the eye is larger than it should be in a red snapper of that size, it being, as Poey has correctly stated, 4 in head. This large size is, however, probably due to the shrinkage of the orbit in drying. Poey also counts "65 scales above the lateral line and 53 below," a larger number than others count in this species. This difference is doubtless dependent on the method of counting. The type of *Lutjanus blackfordi* is of course the present species, and the first good description of the species is that published by Goode & Bean under this name. We are forced, however, to adhere to our original view, that the name *campechanus* certainly belongs to the same fish, and the still older name *aya* is as well authenticated as the names given by Bloch are likely to be. We can not therefore make use of the name *blackfordi* as the specific name of the red snapper.

Acara aya, Marcgrave, Hist. Brasil., 167, 168, 1648, Brazil.
Bodianus aya, Bloch, Ichth., 227, 1790, Brazil; after Marcgrave.
Bodianus ruber, Bloch & Schneider, Syst. Ichth., 330, 1801, Brazil; based on Marcgrave.
Mesoprion campechanus, Poey, Memorias, II, 149, 1860, Campeche.
Lutjanus blackfordi, Goode & Bean, Proc. U. S. Nat. Mus. 1878, 176, Pensacola (Type, No. 21330. Coll. Silas Stearns); Jordan & Gilbert, Synopsis, 549.
Lutjanus campechianus, Poey, Synopsis, 294, 1868; Jordan & Gilbert, Synopsis, 921.
Lutjanus aya, Goode, Bull. U. S. Nat. Mus., V, 55, 1876; Jordan & Fesler, *l. c.*, 447.
Lutjanus vivanus, Jordan & Swain, *l. c.*, 453; not type.

1641. NEOMÆNIS ANALIS (Cuvier & Valenciennes).

(Mutton-fish; Pargo; Pargo Criollo.)

Head $2\frac{2}{3}$; depth $2\frac{2}{3}$. D. X, 14; A. III, 8; scales (7) 10–67–17, pores 51. Body rather deep and compressed, the back rather strongly elevated, profile steep and nearly straight from snout to nape; snout rather long and pointed, $2\frac{3}{5}$ in head; eye rather small, $5\frac{2}{5}$ in head in specimens a foot in length; interorbital space gently convex, $5\frac{2}{5}$ in head; occipital keel moderate; preorbital very broad, its least width 4 in head; mouth moderate; maxillary scarcely reaching front of orbit, $2\frac{5}{7}$ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger but small teeth; 6 rather strong canines in front, 4 of them larger, about equaling in length $\frac{1}{2}$ diameter of pupil; lower jaw with a narrow villiform band in front only and a series of larger teeth outside; these unequal, largest on side of jaw, some of them almost caninelike; tongue with a single very small patch of teeth on its middle, this wanting in young examples; teeth on vomer forming a broadly Λ-shaped patch, without backward prolongation on median line. Gill rakers moderate, ½ length of diameter of eye, about 8 on lower arch, with no rudiments before them. Preopercle with its posterior margin almost straight, slanting gently downward and forward, the notch broad and very shallow; edge of preopercle rather coarsely serrate, most so at the angle; scales small, the rows almost horizontal below the lateral line, running backward and upward above; tubes of lateral line branched; about 7 rows of scales on the cheeks; 1 row on interopercle, 1 on subopercle, and about 9 on opercle; temporal region with about 8 rows of scales, which become smaller posteriorly; bases of soft dorsal and anal scaly. Dorsal spines weak and slender, the outline of the fin not greatly curved, the fourth spine longest, 2⅔ in head, the tenth spine 3⅓ in head; margin of soft dorsal angulate, the ninth ray longest, twice last and 1½ times first ray, 2 in head; caudal well forked, upper lobe the longer, 1⅗ length of middle rays, which are about 2⅙ in head; anal angular, similar to soft dorsal, the middle rays more elevated than in any other species, longest 2¼ length of last, 2 in head; first ray nearly reaching tip of last when the fin is depressed; the second and third anal spines rather strong, of equal length, 3¾ in head; ventrals 1⅗ in head; pectorals reaching slightly past origin of anal, $1\frac{3}{10}$ in head. Color in life, dark olive-green above; many of the scales with pale-blue spots, these forming irregular oblique streaks upward and backward; similar stripes more regular and numerous on caudal peduncle and above anal. In old fishes these blue spots and streaks disappear; belly white, strongly tinged with brick-red; about 6 narrow, dusky, vertical bars, a little broader than the interspaces and not well defined, between gill opening and anal; head bronze-olive, darker above; a broad, undulating, pearly streak from snout below eye to upper edge of gill opening; a narrow blue streak from eye to nostrils; iris fiery red; pectorals, caudal, anal, and ventrals brick-red, the caudal narrowly margined with black and little bronzed above; dorsal reddish along the rays and tips of membranes, otherwise yellowish; distinct lateral blotch just above the lateral line and below the first soft ray on dorsal, about as large as pupil, smaller than in other species similarly marked, and seldom disappearing with age; axil and bar across base of pectoral above, pale or dusky olive. In spirits the markings become fainter, the lateral blotch and the bluish streaks on head usually persisting. Described from a specimen from Key West, 11 inches in length. West Indies; Pensacola to Brazil; rather common at Key West; straying north to Woods Hole; the most important food-fish of the Havana markets, being always abundant and its flesh always healthful. It reaches a large size and its flesh is fairly flavored, although not very delicate. (*analis*, from the elevated anal fin.)

Anthias quartus rondeleti (Mutton-fish), CATESBY, Nat. Hist. Carolina, 1743, Bahamas.

Mesoprion analis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 452, 1828, San Domingo; POEY, Memorias, II, 146, pl. 13, fig. 9, 1860.

Mesoprion sobra,[*] CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 453, 1828, Martinique; GÜNTHER, Cat., I, 209.

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[*] The names *analis* and *sobra* of Cuvier & Valenciennes seem to belong to this species without question. *Mesoprion isodon* is identified by Vaillant with *N. analis* on comparison of typical examples. *Mesoprion rosaceus* was described as a distinct species from a

Mesoprion isodon, Cuvier & Valenciennes, Hist. Nat. Poiss., IX, 443, 1833, San Domingo; Günther, Cat., I, 206.

Mesoprion rosaceus, Poey, Ann. Lyc. Nat. Hist. N. Y., IX, 1870, 317, Cuba.

Lutjanus analis, Poey, Enumeratio, 29, 1875; Jordan, Proc. U. S. Nat. Mus. 1884, 125; Jordan & Swain, *l. c.*, 455; Jordan & Fesler, *l. c.*, 448.

Lutjanus rosaceus, Poey, Enumeratio, 30, 1875.

1642. NEOMÆNIS COLORADO (Jordan & Gilbert).

(Pargo Colorado.)

Head 2¾; depth 3. D. X, 14; A. III, 7; scales 5–47–11; tubes in lateral line 47. Body comparatively deep, highest at front of spinous dorsal, and with an angle at origin of soft dorsal; profile of back evenly arched to origin of dorsal fin; ventral outline rectilinear to origin of anal fin, the base of which fin is very oblique in the young, less so in the adult. Snout rather short, less acute than in *N. novemfasciatus*, less than ⅓ length of head; maxillary reaching nearly or quite to vertical from front pupil, 2¾ in head. Width of cheek from orbit to angle of preopercle less than snout. Eye, in adult, half the interorbital width and ⅖ length of snout, proportionately larger in the young. Vertical margin of preopercle with minute, even serrations for its entire length; a shallow emargination above the angle, which is provided with coarser, but still inconspicuous, serrations; lower limb of preopercle smooth on its anterior half; upper jaw with a very narrow band of villiform teeth behind the conical teeth, which are not very large; a single pair, or more usually two unequal pairs, of canines in front of upper jaw, between which is a pair of small teeth; conical teeth in lower jaw larger than those of upper, close-set, largest in the middle of the jaw, becoming smaller in front and behind, about 8 on each side; vomerine teeth arranged in a crescent-shaped patch, without backward extension on the median line; teeth on tongue in 2 patches, a roundish 1 anteriorly, usually formed by the junction of 3 smaller ones, and an oblong patch on the median line behind this. Gill rakers distant, few, the longest ½ length of orbit, their number about 1+7. Dorsal spines strong, the fourth the longest, the last more than ½ its length, the fourth spine 2¾ in head, as long as the snout in the adult, a little longer in young; soft dorsal and anal similar to each other, some of the posterior rays of each being considerably elevated, the fin thus being pointed instead of rounded in outline; in the young these rays are much longer than the dorsal spines and slightly longer than the caudal peduncle; in the adult they are lower but still longer than the dorsal spines; longest rays of anal about ½ head; caudal not deeply emarginate; pectorals long, acute, reaching to or beyond vent, 1⅕ in head; ventrals not nearly reaching vent, as long as snout and orbit; anal spines strong, the second rather longer than third and a little stronger, 3⅓ in head. Scales rather small, the series forming an angle at the lateral line, those below it running the more obliquely, those above forming nearly horizontal series parallel with

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large specimen 27½ inches in length. The only tangible distinction which we find in the long description is that the eye is one-sixth the length of the head, while in *N. analis* of the same size the eye is 8½ in the head. We hesitate to admit *N. rosaceus* as distinct from *N. analis*. The larger eye and redder coloration perhaps indicate a specimen from deeper water than usual. Specimens of this species are in the museum at Cambridge from Nassau, Rio Janeiro, and Rio Grande do Norte.

the lateral line; scales on cheeks in about 7 rows, 1 row on subopercle and about 7 on opercle; scales on breast very small, much smaller than those on opercle; soft rays of vertical fins with accompanying series of scales. Coloration in life: Above dark olivaceous, each scale with the basal half dark olive-brown; sides with or without some silvery luster at bases of scales, forming, when present, faint longitudinal streaks; head and lower parts of body bright red, especially bright on lower parts of head, the color extending up on the sides for a varying distance; upper jaw and maxillary reddish; upper parts of head dark olivaceous; scales on sides of head without dark spots; a much-interrupted light blue line from middle of preorbital along suborbital, rarely extending behind the orbit, much less distinct than in *N. argentiventris*, and disappearing in alcohol; cheeks sometimes with bluish spots or lines; inside of mouth red; vertical fins very dark, with more or less reddish; spinous dorsal with a broad median streak of very light slaty blue; pectorals and ventrals reddish, the latter with dusky. Length $2\frac{1}{2}$ feet. Guaymas to Panama; a common food-fish; here described from the original type from Mazatlan. (Spanish, *colorado*, red (colored), in allusion to the common name, *Pargo colorado.*)

Lutjanus colorado, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 338, 351, 355, Mazatlan (Types, Nos. 28386, 28305, 28261, and 28383, U. S. N. M. Coll. Dr. Gilbert); JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 107, 110; JORDAN & SWAIN, *l. c.*, 457; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 147; JORDAN & FESLER, *l. c.*, 449.

Lutianus colorado, JORDAN, Fishes Sinaloa, 456.

1643. NEOMÆNIS BRACHYPTERUS (Cope).

Head $2\frac{3}{4}$; depth 3. D. X, 12; A. III, 8; scales 8–51–X, 47 pores. Form of *N. griseus.* Maxillary $2\frac{1}{2}$ in head, reaching to past front of eye. Canines very small, developed in upper jaw only; tongue with an oval patch of teeth; vomer with a Λ-shaped patch of teeth, there being a short backward projection on the median line; eye rather small, $4\frac{2}{5}$ in head. Gill rakers few, arranged as in *N. griseus.* Scales above lateral line arranged in very oblique series; 2 bands of small scales on temporal region. Anal fin low, its longest rays $2\frac{3}{5}$ in head; second anal spine about as long as third, $3\frac{5}{6}$ in head; caudal little forked, its longest rays $1\frac{1}{2}$ in head; pectoral fin short, $1\frac{2}{3}$ in head. Color in spirits, olivaceous, with silvery luster below; rows of obscure dusky spots along the scales on sides and yellowish oblique streaks above the lateral line; fins rather dark, the caudal not pale; no black lateral spot. The above account is taken from Professor Cope's original type in the museum of the Philadelphia Academy of Sciences. The species is allied to *N. griseus*, although apparently distinct from that species and from all others known to us. In its technical characters it approaches most closely to *N. synagris*, near which species it is convenient to place it in our analytical key. If we suppose the type of *N. ambiguus* to be a hybrid, *synagris+chrysurus*, we may suspect *N. brachypterus* to represent a hybrid of *griseus* and *synagris*. The evidence in the latter case is less striking than in the former. Bahama Islands; only the type known. (*βραχύς*, short; *πτερόν*, fin.)

Lutjanus brachypterus, COPE, Trans. Am. Phil. Soc. 1871, 470, New Providence; JORDAN & SWAIN, *l. c.*, 447, description from type; JORDAN & FESLER, *l. c.*, 449.

1644. NEOMÆNIS GUTTATUS (Steindachner).

(Flamenco.)

Head $2\frac{3}{4}$; depth $2\frac{3}{4}$. D. X, 12 (rarely XI, 11); A. III, 8; scales (6) 7–53–15, 53 pores. Body oblong, compressed, the back rather more elevated than in *N. synagris*, the anterior profile nearly straight from snout to above eye, thence rather strongly convex; snout pointed, rather long, $3\frac{1}{8}$ in head; eye large, $4\frac{1}{2}$ in head; interorbital space gently convex, its width $5\frac{3}{4}$ in head; occipital keel rather prominent; preorbital narrow, its least width 7 in head; maxillary extending to somewhat beyond front of orbit, $2\frac{9}{10}$ in head. Teeth as in *N. synagris*, the canines in upper jaw small, those of lower jaw inconspicuous; tongue with a single large oblong patch of teeth; vomer with an ∧-shaped patch of teeth, the prolongation on the median line rather short. Gill rakers rather long, about 9 on lower part of arch, with a few rudiments in front of them. Posterior limb of preopercle extending downward and forward, the emargination broad and rather shallow; teeth at angle of preopercle rather coarse, those above emargination much finer. Scales rather large, those below lateral line in series which are almost horizontal, those above in series which are very oblique and for the most part regular and nearly straight; cheek with 6 rows of scales, interopercle with 1; temporal region with a series of large scales, before and behind which is a broad band of small ones; bases of soft dorsal and anal scaly. Dorsal spines rather slender and weak, the outline of the fin gently convex, the longest spine $2\frac{2}{3}$ in head; soft dorsal short and moderately high, its margin angulated, the eighth ray about $\frac{1}{3}$ longer than last ray, and $2\frac{4}{5}$ in head; caudal lunate, the upper lobe $1\frac{1}{2}$ in head; anal moderate, rounded in outline, its longest ray $2\frac{2}{3}$ in head; first soft ray reaching tip of last ray when the fin is depressed; second anal spine stronger than the third and of about equal length, $4\frac{1}{5}$ in head; ventrals $1\frac{5}{6}$ in head; pectorals long, nearly reaching front of anal, $1\frac{1}{5}$ in head. Color in spirits brown above, the sides bright silvery; a large round, black, lateral blotch, as large as eye, on lateral line below front of soft dorsal; each scale above lateral line with a faint darker grayish median spot, these forming oblique streaks; sides of head often with similar spots; two or three similar streaks often present below lateral line, these straight and horizontal; each series of scales below lateral line with a narrow yellow stripe; snout and preorbital with dark vermiculations; fins all pale. In life, light olivaceous above, the markings bronze-olive; sides pale crimson, the marks more yellow; belly golden-yellow; scarlet on iris, yellow about eye; first dorsal reddish, second with reddish-brown markings; caudal deep rich red; lower fins golden; pectoral nearly colorless; sides of head pink with golden stripes. Described from a specimen from Mazatlan $10\frac{1}{2}$ inches in length. West coast of Mexico from Guaymas to Panama. It is a common food-fish at Guaymas, Mazatlan, and Panama; a small species rarely more than a foot in length, representing *Neomænis synagris* in the Pacific. (*guttatus*, spotted.)

Mesoprion guttatus, Steindachner, Ichth. Notizen, IX, 18, pl. 8, 1869, Mazatlan.

Lutjanus guttatus, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1881, 354; Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 107, 110; Jordan & Swain, *l. c.*, 447; Evermann & Jenkins, Proc. U. S. Nat. Mus. 1891, 147; Jordan, *l. c.*, 181, 1889; Jordan & Fesler, *l. c.*, 449.

Lutianus guttatus, Jordan, Fishes Sinaloa, 456.

1645. NEOMÆNIS SYNAGRIS (Linnæus).

(Lane Snapper; Biajaiba; Red-tail Snapper.)

Head $2\frac{3}{5}$; depth $2\frac{4}{5}$. D. X, 12; A. III, 8; scales (7) 8–60–15, 50 pores. Body oblong, compressed, the back moderately elevated, profile almost straight from snout to nape; snout rather pointed, 3 in head; eye moderate, 5 in head; interorbital space gently convex, $5\frac{3}{4}$ in head; occipital keel little prominent; preorbital rather broad, $4\frac{3}{4}$ in head; maxillary reaching front of orbit, $2\frac{3}{4}$ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged teeth; 4 rather small canines in front, 2 of them larger; lower jaw with villiform band in front only, the single row of larger teeth nearly equal in size, none of them canines; tongue with a single oval patch, its length more than twice its width; vomer with a ∧ or ⩚-shaped patch of teeth, without backward prolongation on median line, or with only a very slight one. Gill rakers rather long, their length slightly more than $\frac{1}{2}$ diameter of eye, about 5 + 9, and no rudiments before them. Preopercle with its posterior margin slanting downward and forward, the emargination broad and moderately deep; preopercle rather finely serrate above, with coarser teeth at the angle. Scales rather small, the rows almost horizontal below the lateral line, above somewhat undulate, running upward and backward; tubes of lateral line simple; 6 rows of scales on the cheek, 1 row on the interopercle, 1 on the subopercle, and 6 on the opercle; temporal region with a broad band of scales, arranged in several series; base of soft dorsal and anal scaly; dorsal spines rather weak and slender, the outline of the fin gently convex, the fourth spine longest, $2\frac{2}{3}$ in head, the tenth spine $3\frac{3}{5}$ in head; soft dorsal short, its margin somewhat angulated, the eighth ray longest, twice the length of last ray and $1\frac{1}{2}$ first, $2\frac{2}{5}$ in head; caudal moderately forked, the upper lobe the longer, $1\frac{1}{2}$ length of middle rays, which are 2 in head; anal rather high, rounded in outline, its middle rays longest, $1\frac{2}{3}$ length of last ray, $2\frac{4}{7}$ in head, first ray reaching middle of last ray when the fin is depressed; second anal spine stronger than third and of equal length, $3\frac{2}{3}$ in head; ventrals $1\frac{3}{4}$ in head; pectorals reaching front of anal, $1\frac{1}{4}$ in head. Color in life, rose-colored, silvery tinged below, slightly olivaceous but not dark above; a large, round, maroon blotch, larger than eye, just above lateral line and below front of soft dorsal, always present; series of stripes of deep golden-yellow along sides; 3 on head, the upper from snout through eye; about 10 on body, the lower nearly straight and horizontal, the upper undulating and irregular, extending upward and backward; belly white, its sides largely yellowish; lips red; maxillary partly yellow; tongue yellowish; iris fiery red; caudal deep blood-red; spinous dorsal nearly transparent, with a marginal and basal band of golden; soft dorsal light red, edged with golden; ventrals and anal golden; pectorals pinkish. Young quite green above. Similarly striped Cuban specimens are generally duller, with the yellow stripes decidedly coppery. In spirits the bright colors fade, only the lateral blotch and the streaks on the head being persistent. West Indies; Florida Keys to Colon and Brazil; very common almost everywhere from

Tampa to Brazil. It reaches but a small size, rarely exceeding a foot, and it inhabits chiefly shallow waters. In Havana it is one of the most common food-fishes, in abundance not exceeded by any other species. Its strongly marked coloration renders its recognition easy. (*συναγρίς*, an old name of *Dentex dentex*, a species which this one was thought to resemble.)

Salpa purpurescens variegata (Lane Snapper), CATESBY, Hist. Nat. Carolina, pl. 17, 1743, Bahamas.

Sparus synagris, LINNÆUS, Syst. Nat., X, 280, 1758; after CATESBY.

Sparus vermicularis, BLOCH & SCHNEIDER, Syst. Ichth., 275, 1801, Martinique; on a drawing by PLUMIER.

Lutjanus aubrieti, DESMAREST, Prem. Dec. Ichth., 17, pl. 2, 1823, Cuba.

Mesoprion uninotatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 449, 1828, San Domingo; Martinique; GÜNTHER, Cat., I, 202.

Lutjanus uninotatus, POEY, Synopsis, 294, 1868.

Lutjanus synagris, POEY, Enumeratio, 27, 1875; JORDAN & GILBERT, Synopsis, 922; JORDAN & SWAIN, *l. c.*, 448; JORDAN, Proc. U. S. Nat. Mus. 1889, 648; JORDAN, *l. c.*, 1890, 319; JORDAN & FESLER, *l. c.*, 450.

1646. NEOMÆNIS AMBIGUUS* (Poey).

Head $2\frac{9}{10}$; depth 3. D. X, 13; A. III, 9; scales (6) 9–53–15, 50 pores. Body oblong, compressed, formed much as in *N. synagris*, but more slender, the anterior profile nearly straight from tip of snout to nape, thence convex; snout rather long and pointed, 3 in head; eye small, $4\frac{2}{3}$ in head; interorbital space narrow, carinate, its width $5\frac{1}{5}$ in head; occipital keel rather prominent; preorbital moderate, its least width 6 in head; mouth moderate, slightly oblique, the lower jaw a little projecting, the maxillary extending to opposite front of pupil, its length $2\frac{3}{4}$ in head. Teeth essentially as in *N. synagris;* canines of upper jaw small; enlarged teeth of lower jaw scarcely caninelike; tongue with a single, large, oblong patch of teeth; vomer with an ʌ-shaped patch of teeth, the prolongation on the median line moderate; no pterygoid teeth. Gill rakers longer than in most species of *Neomænis*, about 15 developed on lower part of anterior arch. Preopercle nearly vertical, its emargination very slight, its serræ distinct. Scales rather small, those below lateral line in horizontal series, those above lateral line in regular and very oblique series, which are not parallel with the lateral line; cheek with 5 rows of scales; temporal region scaled from the eye backward, posteriorly with a band of rather large scales followed by smaller ones; bases of soft dorsal and anal scaly; dorsal fin little emarginate, the spines rather slender and low, the longest $2\frac{1}{2}$ in head; longest ray of soft dorsal $2\frac{4}{5}$ in head; caudal rather deeply forked, the longest rays $1\frac{1}{4}$ in head, the median rays $3\frac{2}{3}$; anal spines slender, regularly graduated, the second spine $4\frac{4}{6}$ in head; soft anal rounded, rather low, the longest rays $2\frac{3}{5}$ in head; pectorals long and falcate, $1\frac{1}{6}$ in head; ventrals $1\frac{2}{3}$. In spirits, nearly uniform brownish above, paler below, with pale streaks along the rows of scales. In life, according to Poey's figure, it had much the coloration of *Neomænis synagris.* Described from a specimen from Havana 10 inches in length. Cuba; 2 specimens known. (*ambiguus,* uncertain.)

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* This species is very well distinguished from *Neomænis synagris* and from *Ocyurus chrysurus*, but it presents such a singular blending of the characters of the two as to lend much probability to Poey's conjecture that it is a hybrid of *Neomænis synagris* with *Ocyurus chrysurus*. Two specimens are known, the one sent by Poey to the U. S. National Museum and described in the paper of Jordan & Swain; the other sent by Poey to the museum at Cambridge, is very similar, with well-forked caudal and numerous gill rakers. The lower jaw is, however, scarcely projecting, and the pectoral short, $1\frac{2}{3}$ in head.

Mesoprion ambiguus, Poey, Memorias, II, 152, pl. 12, fig. 4, pl. 13, fig. 8, 1860, Cuba (Type, No. 13036, U. S. N. M.); Poey, Synopsis, 295.

Lutjanus ambiguus, Poey, Enumeratio, 30, 1875; Jordan & Swain, *l. c.*, 450; Jordan & Fesler, *l. c.*, 450.

1647. **NEOMÆNIS MAHOGONI** (Cuvier & Valenciennes).

(OJANCO; MAHOGANY SNAPPER.)

Head $2\frac{1}{2}$; depth $2\frac{4}{5}$. D. X, 12; A. III, 8; scales (6) 9–62–14, 50 pores. Body rather elongate, strongly compressed, the back well elevated, profile almost straight or slightly concave from tip of snout to nape, thence moderately convex; snout rather slender and pointed, 3 in head; eye large, $3\frac{2}{3}$ in head; interorbital area flattish, with a median keel, 6 in head; preorbital rather broad, its least width $6\frac{1}{5}$ in head; mouth large, maxillary reaching front of pupil, $2\frac{1}{2}$ in head; lower jaw strongly projecting; upper jaw with a narrow band of villiform teeth, outside of which is a single series of enlarged but comparatively small teeth; 4 moderate canines in front of jaw, 2 of them larger, about 2 in diameter of pupil; lower jaw with a single series of rather small teeth, none of them at all canine-like; tongue with an oblanceolate patch of teeth, tapering behind, its length more than twice its width; vomer with a broadly arrow-shaped patch of teeth, with backward prolongation on median line, its length about equaling width of patch in front; pterygoid and hyoid bones without teeth. Gill rakers numerous, about 10 developed on lower part of arch, besides 4 or 5 rudimentary ones, those near angle largest, their length almost $\frac{1}{2}$ diameter of eye. Preopercle with its posterior margin almost vertical, broadly and rather deeply emarginate, very weakly or scarcely serrate above, the angle projecting backward and armed with several rather coarse teeth, the lower limb smooth. Scales rather small, those below lateral line somewhat larger, the rows above the lateral line running obliquely upward and backward, those below in almost straight horizontal series; cheeks with 6 rows of scales, 1 row on interopercle, 1 on subopercle, and 7 on opercle; temporal region with a band of small scales, before and behind which is a series of larger ones; top of head, snout, and jaws naked; bases of soft dorsal and anal scaly. Dorsal spines rather weak and slender, the outline of the fin rather strongly convex, the fourth spine longest, $2\frac{4}{7}$ in head; the tenth spine 4 in head; margin of soft dorsal very gently convex, the first and last rays slightly shorter than rest of fin, median rays $3\frac{1}{3}$ in head; caudal not deeply forked, the upper lobe little longer than lower, its length $1\frac{2}{5}$ in middle rays, which are $2\frac{1}{8}$ in head, margin of anal little rounded, the middle rays $1\frac{2}{3}$ length of last ray, 3 in head, the first ray reaching almost to tip of last ray when the fin is depressed; anal spines small, the second as long as third and stronger, $4\frac{2}{5}$ in head; ventrals $2\frac{1}{5}$ in head; pectorals scarcely reaching front of anal, $1\frac{1}{3}$ in head. Color in life, deep brown, silvery below, everywhere shaded with red, especially on head; eye scarlet; a large blackish blotch on side, chiefly above lateral line and below first rays of soft dorsal; maxillary yellow on covered parts; narrow bronze streaks following the rows of scales, these streaks distinct chiefly above the lateral line; dorsal fin pale, edged with blood-red; caudal deep red; anal, ventrals, and pectorals scarlet; the bright colors fade and disappear in spirits, leaving the back dark gray, the lower parts silvery, more or less flushed with red. Described from a Cuban specimen 10 inches long. West Indies; a small species, rather common in the markets of Havana, where it is known as *ojanco*, in allusion to the large eye. It does not reach a large size. (*mahogoni*, the English mahogany, from the brown coloration.)

Mesoprion mahogoni, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 447, 1828, Martinique; GÜNTHER, Cat., I, 203
Mesoprion ricardi, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 447, 1828, Martinique.
Mesoprion ojanco, POEY, Memorias, II, 150, pl. 13, fig. 10, 1860, Cuba.
Lutjanus ojanco, POEY, Enumeratio, 28, 1875.
Lutjanus mahogoni, JORDAN & SWAIN, *l. c.*, 451; JORDAN & FESLER, *l. c.*, 451.

Subgenus RAIZERO, Jordan & Fesler.

1648. NEOMÆNIS ARATUS (Günther).

(PARGO DE RAIZERO.)

Head 3; depth 3⅕. D. XI, 12; A. III, 7; scales 4½–45–12. Body oblong-elliptical, slenderer and less compressed than in other species of *Neomænis*, the back broad and little elevated; profile a little depressed above the snout, then convex above the eyes, thence nearly straight to front of dorsal; snout not very long, 3 in head; mouth moderate, somewhat oblique, the jaws subequal; maxillary extending to beyond front of eye, its length 2⅓ in head. Teeth moderate; canines of upper jaw not very large; the enlarged teeth of lower jaw scarcely caninelike; teeth on tongue in a large patch, developed in adult examples, but not evident in the young; teeth on vomer in a V-shaped patch, without backward prolongation on the median line; palatine teeth in a broad patch; no teeth on pterygoids. Eye large, 5 in head; interorbital area broad and convex, its width 4 in head; preorbital moderate, its least breadth 6 in head. Nostrils small, well separated, oblong, the anterior but little the larger. Preopercle with its posterior limb slanting downwards and forwards, with a moderate emargination, sharply and finely serrate above, the teeth at the angle coarser and directed somewhat forwards. Gill rakers few and rather small, about 7 on lower part of anterior arch, not preceded by rudiments. Scales large, arranged very regularly in horizontal series parallel with the lateral line, both above and below; cheeks with 6 rows of scales; nape with a band of about 3 series of moderate scales; soft dorsal and anal well scaled; tubes of lateral line well branched. Dorsal spines moderate, the longest 2⅔ in head; soft dorsal rather low and short; caudal rather deeply lunate, the upper lobe 1⅙ in head; anal low, its longest rays 2⅖ in head; anal spines graduated, the second spine shorter and stouter than third, about 5½ in head; pectoral long and falcate, 1⅙ in head; ventrals 1⅚. Color, in spirits, dark brown; somewhat paler below; center of each scale yellowish-silvery, these forming conspicuous continuous silvery streaks along the back and sides, most distinct near the middle of the body; fins grayish, rather pale; membrane of soft dorsal dusky; ventrals dusky at tips; young with pale crossbands formed by enlargement of the silvery spots in certain regions. In life, dark green, the dark stripes on sides dark brown, the interspaces yellowish-white; belly coppery-red, some bluish on cheeks; pectoral maroon red; ventrals salmon-red, the first ray white; anal creamy-red; caudal dark red, blackish towards tip; dorsal dusky; throat silvery. Described from a specimen from Mazatlan 16 inches in length. Length 2 feet. Pacific coast of tropical America, generally common; a handsome fish looking quite unlike the others. There is, however, no difference of importance in the structure of the skull. The squamation is very similar to that of *Orthostœchus*. (*aratus*, plowed, for its striped coloration.)

Mesoprion aratus, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 145, Panama; Chiapas.
Lutjanus aratus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 355; JORDAN & SWAIN, *l. c.*, 460; JORDAN & FESLER, *l. c.*, 451; JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 457.

526. RABIRUBIA, Jordan & Fesler.

Rabirubia, JORDAN & FESLER, Rept. U. S. Fish Comm. 1889 (1893), 438 (*inermis*).

This genus is closely allied to *Ocyurus*, having, as in the latter genus, the long fronto-occipital crest continued forward along the top of the head to the nostrils. Parietal crest extending to above eye, coalescing with the orbital rim. The body is rather elongate, the anal fin long and low, and the gill rakers are few and short. One species known. (*Rabirubia*, Spanish name of *Ocyurus chrysurus*.)

1649. RABIRUBIA INERMIS (Peters).

Head 3 in length; depth 3½; lateral line with 50 tubes; scales 53. D. X, 13; A. III, 11. Body slender and fusiform, not strongly compressed, the back not elevated; snout very pointed; mouth unusually small, the maxillary 2½ in head, reaching to front of pupil; eye very large, about 4 in head. Band of vomerine teeth slightly produced backward on the median line; teeth on tongue well developed; canine teeth unusually small and slender, 2 in upper jaw and 3 or 4 on each side of lower. Nostrils well separated, subequal, the posterior oblong, the anterior round. Preorbital ⅖ depth of eye; preopercle not serrate, scarcely notched behind; temporal region with a band of large scales, on each side of which are small scales; scales above lateral line arranged in very oblique series, which are not parallel with the lateral line. Pectoral fins very short, reaching little past tips of ventrals, 1¾ in head; dorsal spines very slender; second anal spine longer than third, very small, 7 in head; soft dorsal and anal low, scaly; caudal fin rather deeply forked, the middle rays not half the length of the outer, which are 1⅓ in head. Color in spirits, dusky brown above, pale below, with distinct dark stripes, those below parallel with the lateral line, those above very oblique; these stripes extend along the edges of the rows of scales, the middle of each scale being whitish or silvery, its base dusky, a brown blotch about base of pectoral. Mazatlan to Panama; only 2 specimens known; 1 is in the museum at Berlin from Mazatlan, from which specimen the above description was taken; the other was taken by the *Albatross* at Panama. It is quite unlike any other American species. (*inermis,* unarmed.)

Mesoprion inermis, PETERS, Berliner Monatsber. 1869, 705, Mazatlan.
Lutjanus inermis, JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 285; JORDAN & SWAIN, *l. c.*, 459; JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 181; JORDAN & FESLER, *l. c.*, 451.
Rabirubia inermis, JORDAN, Fishes Sinaloa, 457, pl. 39.

527. OCYURUS, Gill.

(RABIRUBIAS.)

Ocyurus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 236 (*chrysurus*).

This genus is allied to *Neomænis,* from which it differs notably in the structure of the skull, especially in the forward extension of the fronto-occipital crest to the ethmoidal projection; the prefrontals with posterior areas short and excavated above and in front. The single species shows numerous minor peculiarities, as the peculiar form of the body, the large, well-forked caudal fin, the small head, as well as an increased number of gill rakers, and the presence (in the adult) of pterygoid teeth. (ωκυς, swift; οὐρά, tail.)

1650. OCYURUS CHRYSURUS (Bloch).

(YELLOW-TAIL; RABIRUBIA.)

Head 3; depth 3. D. X, 13; A. III, 9; scales 7–65–15, 51 pores. Body elliptical, comparatively elongate, the back little elevated, the profile straight from the tip of the snout to the nape, thence rather strongly arched; caudal peduncle long and slender; snout pointed, of moderate length, 3 in head; eye small, 5 in head; interorbital space very convex, with a sharp median keel, 4 in head; preorbital narrow, its least width $6\frac{2}{3}$ in head. Mouth small, oblique, the lower jaw projecting; maxillary reaching very slightly beyond front of orbit, $2\frac{5}{7}$ in head; upper jaw with a narrow band of villiform teeth, outside of which is a single series of larger teeth, 5 or 6 of those in front being somewhat caninelike, but small; lower jaw with a single series of moderately strong teeth, none of them large enough to be called canines; tongue with a large, oval patch of teeth, in front of which is a smaller but similar patch; teeth on vomer forming a broadly arrow-shaped patch, with a backward prolongation on the median line, which is nearly twice the width of the patch; a narrow band of pterygoid teeth behind the patch on the vomer, this not evident in young examples. Gill rakers rather long and slender, the longest about ½ diameter of eye, about 8+21, none of them rudimentary. Preopercle with its posterior margin almost vertical, with a slight, but distinct emargination above the angle; serrations of preopercle very feeble, the teeth at the angle scarcely enlarged; nostrils well separated, the posterior slitlike; scales small, those above lateral line arranged in very oblique series, those below in rows nearly horizontal; cheeks with 5 or 6 rows of scales, about two rows on interopercle; temporal region with 2 or 3 series of large scales before and behind which are many small scales; top of head, snout, and jaws naked; bases of soft dorsal and anal scaly. Dorsal spines rather long and slender, the fin not deeply emarginate, fifth spine longest, $2\frac{2}{5}$ in head; tenth spine $3\frac{3}{4}$; soft dorsal and anal similar, their margins nearly straight, the last rays slightly shortened, median rays about 3 in head; caudal fin long, very deeply forked, the upper lobe longest, 3 times as long as middle rays, which are $2\frac{1}{2}$ in head; pectorals long and slender, reaching vent, $1\frac{1}{8}$ in head; ventrals $1\frac{4}{7}$ in head; anal spines rather weak, the third $\frac{1}{3}$ longer than second, 4 in head. Color in life olivaceous above, rather pale, and somewhat violet tinged; a number of large, irregular deep yellow blotches on sides of back; a deep yellow stripe from tip of snout straight through eye to caudal peduncle, there broadening and including all of tail above lateral line and behind dorsal fin; above this a pearly-purplish area; below it a flesh-colored or rosy area or band, 2 scales broad, then a succession of about 16 narrow streaks alternating flesh-color and yellow, growing fainter progressively below; the yellow on the edges of the scales, the reddish on their middles; iris fiery red; lower parts of head flesh-color with some yellow spots; maxillary mostly yellow; caudal deep yellow, its edges reddish; dorsal chiefly yellow; anal faintly yellow; ventrals and pectorals translucent. In spirits, all the markings fade, leaving the fins yellowish, the upper parts grayish, the lower rosy-silvery. Length 2 feet. West Indies, and from southern Florida to Brazil; very abundant at Key West where it is known as "yellow-tail." In Cuba, next to *N. analis* and *N. synagris*, the commonest of the snappers. One of the handsomest of the snappers; here described from a Key West specimen. (*χρυσός*, gold; *οὐρά*, tail.)

Acara pitamba, MARCGRAVE, Hist. Brasil., 155, 1648, Brazil.
Rabirubia, PARRA, Descr. Dif. Piezas, Hist. Nat., pl. 20, fig. 1, 1787, Cuba.
Sparus chrysurus, BLOCH, Ichth., pl. 262, 1790, Brazil; after MARCGRAVE.
Anthias rabirubia, BLOCH & SCHNEIDER, Syst. Ichth., 309, 1801, Cuba; after PARRA.
Sparus semiluna, LACÉPÈDE, Hist. Nat. Poiss., IV, 141, 1803, Martinique; on a copy of a drawing by PLUMIER.
Mesoprion aurovittatus, AGASSIZ, Spix, Pisc. Brasil., pl. 66, 1829, Brazil.
Ocyurus rijgersmœi, COPE, Trans. Am. Phil. Soc. 1871, 468, fig. 4, St. Kitts.
Mesoprion chrysurus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 459, 1828; GÜNTHER, Cat., I, 186.
Ocyurus chrysurus, POEY, Synopsis, 295, 1868; JORDAN & SWAIN, *l. c.*, 461; JORDAN, *l. c.*, 319; JORDAN & FESLER, *l. c.*, 452.
Ocyurus aurovittatus, POEY, Synopsis, 295, 1868.
Lutjanus chrysurus, VAILLANT, Miss. Sci. au Mexique, 133, pl. 5, 1875.
Lutjanus melanurus, JORDAN & GILBERT, Synopsis, 548, 1883; not type.

528. RHOMBOPLITES, Gill.

Rhomboplites, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 237 (*aurorubens*).

This genus differs from *Neomænis* chiefly in the character of the cranium. Prefrontals with the articular facets developed from simple tubercles and not V-shaped, the posterior areas cribriform; basi-sphenoid not lobigerous; pterygoid with a broad patch of teeth (in adult); hyoid bones and tongue with teeth; canines very small or obsolete; dorsal spines 12, the soft rays 10 or 11; gill rakers slender and numerous.

This genus is closely allied to *Neomænis,* but the cranial peculiarities and extension of the villiform teeth over the pterygoid and hyoid bones well warrant generic separation. The form of the vomerine patch of teeth is also somewhat peculiar. But one species is known. (*ῥόμβος*, rhomb; *ὁπλίτης*, armed; from the form of the vomerine patch of teeth.)

1651. **RHOMBOPLITES AURORUBENS** (Cuvier & Valenciennes).

(CAGON DE LO ALTO.)

Head $3\frac{1}{6}$; depth $3\frac{1}{6}$. D. XII, 11; A. III, 8; scales (7) 10–72–19, 50 pores. Body elongate, irregularly elliptical, the back not greatly elevated, highest at the nape; profile regularly and strongly convex from above eye to spinous dorsal; snout rather short and bluntish, $3\frac{3}{5}$ in head, its upper profile straight and steep; eye very large, $3\frac{3}{4}$ in head; interorbital space very convex, $3\frac{1}{2}$ in head; preorbital narrow, its least width $7\frac{1}{2}$ in head; mouth small, oblique, the lower jaw somewhat projecting; maxillary scaleless, reaching front of orbit, $2\frac{5}{7}$ in head. Upper jaw with a broad band of villiform teeth, outside of which is a row of enlarged but comparatively small teeth; no canines; lower jaw with one series somewhat stronger than outer teeth of upper jaw; inside of these is a rather broad villiform band of teeth in front of jaw only; tongue with a very broad irregularly ovate patch of teeth, its width almost as great as width of tongue, $1\frac{1}{2}$ in its length; in front of this patch is a large roundish patch of teeth; an oblong patch of teeth on the hyoid bone; vomer with a rhomboid (◇-shaped) patch of teeth, forming almost a right angle in front, with a broadly wedge-shaped backward prolongation on the median line, its length about twice its width; palatine band of teeth very wide; pterygoids with a large patch of teeth, these teeth undeveloped and covered by skin in young examples. Gill rakers numerous, the longest about $\frac{1}{2}$ diameter of eye, about 6+21. Preopercle with posterior margin almost straight and vertical, slightly emarginate, weakly serrate above, the teeth coarser at the angle and on lower border. Posterior nostril larger, nearly round. Scales very small, the rows above the lateral line running upward and backward, the rows below rather wavy, almost horizontal; temporal region covered with small partially embedded scales, in 4 or 5 rows; cheeks with 7 rows of scales; 4 rows on interopercle, 3 rows on subopercle, and 7 on opercle; snout, preorbital and jaws naked; top of head scaly to near middle of eye; soft dorsal and anal with but few scales at base. Dorsal spines long and slender, the fourth spine longest, $2\frac{1}{4}$ in head, the length of the spines thence gradually decreasing to twelfth spine, which is $3\frac{1}{3}$ in head; margin of soft dorsal truncate, its rays of subequal length, 4 in head, last ray slightly shorter; caudal deeply forked, the upper lobe longer than lower, its length $1\frac{3}{4}$ times middle rays, which are 2 in head; upper lobe of caudal scarcely shorter than head; anal similar to soft dorsal, its rays 3 in head; second anal spine shorter than third, 4 in head; ventrals $1\frac{1}{2}$ in head; pectorals somewhat falcate, reaching opposite vent, $1\frac{1}{5}$ in head. Color in life, vermilion; paler below; faint brown lines running obliquely forward and downward from dorsal along the rows of scales; sides with narrow sinuous streaks of golden yellow, some of them longitudinal, others oblique; dorsal rosy, its margin chiefly orange; anal pale at base, rosy at extremity; pectorals yellowish, ventrals rosy, caudal vermilion; iris vermilion-red; inside of mouth dusky. The bright colors grow faint or disappear in spirits. Length about a foot; here described from a specimen from Havana. West Indies, north to Charleston, south to Rio Janeiro; not uncommon in deep waters as far north as Charleston and Pensacola. Specimens from the coast of Carolina are somewhat deeper than those from Cuba, and with the yellow streaks more pronounced, becoming dark brown in spirits. One of these, in the U. S. National Museum, has 13 dorsal spines. It is not, however, otherwise essentially different. (*aureus*, golden; *rubens*, reddish.)

Centropristis aurorubens, Cuvier & Valenciennes, Hist. Nat. Poiss., III, 45, 1829, Brazil, Martinique, San Domingo.
Mesoprion elegans, Poey, Memorias, II, 153, 1860, Cuba.
Aprion ariommus, Jordan & Gilbert, Proc. U. S. Nat, Mus. 1883, 142, Pensacola; young with pterygoid teeth undeveloped.
Mesoprion aurorubens, Günther, Cat., I, 207.
Rhomboplites aurorubens, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 236; Jordan & Fesler, *l. c.*, 454.
Rhomboplites elegans, Poey, Repertorio, II, 158, 1868.
Lutjanus aurorubens, Vaillant & Bocourt, Miss. Sci. au Mexique, 117, 1877; Jordan & Gilbert, Synopsis, 549.

529. APSILUS, Cuvier & Valenciennes.

(Arnillos.)

Apsilus, Cuvier & Valenciennes, Hist. Nat. Poiss., VI, 548, 1830 (*fuscus*, an East Indian species).
Tropidinius (Gill, MS.) Poey, Synopsis, 296, 1868 (*arnillo* = *dentatus*).

This very distinct genus has essentially the cranial structure of *Rhomboplites*, with the scaleless fins, peculiar squamation, and dentition of *Aprion*. The prefrontals have the posterior areas solid and somewhat tumid; there are no teeth on the pterygoids, tongue, or hyoid bones. The dorsal fin is short and scaleless. (*α*, privative; *ψιλός*, bare or bald; the meaning not evident. Our species representing the subgenus *Tropidinius*, differs from *Apsilus fuscus* chiefly in the deeper body and larger head.)

Subgenus TROPIDINIUS, Gill.*

1652. APSILUS DENTATUS, Guichenot.

(Arnillo.)

Head 3; depth $2\frac{5}{7}$. D. X, 10; A. III, 8. Scales 7–60–16, 60 pores. Body rather deep, oblong, elliptical, compressed, the back somewhat elevated; profile from snout to nape little convex, the nape strongly keeled and considerably convex; snout rather short and blunt, $3\frac{1}{2}$ in head; eye large,

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* *τρόπις* keel; *ἴνιον*, nape.

$3\frac{5}{6}$ in head; interorbital space convex, $3\frac{4}{5}$ in head, its median line becoming on the occiput a sharp keel; preorbital very narrow, $7\frac{2}{3}$ in head; mouth small; maxillary broad, almost reaching pupil, $2\frac{1}{2}$ in head; upper jaw with a narrow band of villiform teeth, outside of which is a series of larger, which are scarcely large enough to be called canines; lower jaw with a single series of small teeth, about 6 of those in front larger, scarcely caninelike, similar to the larger teeth of upper jaw; inside of this series is a comparatively wide band of villiform teeth in front of jaw only; tongue without teeth; vomer with a Λ-shaped patch of teeth, without backward prolongation on median line. Gill rakers numerous, the longest $\frac{2}{5}$ diameter of eye, about 17 on lower half of arch. Preopercle with its posterior margin nearly vertical, very slightly emarginate, scarcely serrate except at angle, where the teeth are quite small. Scales rather small, very regularly arranged, the rows running parallel with the lateral line both above and below; 7 rows on cheek, the scales of upper row little enlarged; 2 rows on interopercle, $1\frac{1}{2}$ on subopercle, 6 on opercle; temporal region with four rows of moderate scales; top of head, snout, and jaws naked; bases of soft dorsal and anal scaleless. Dorsal fin not strongly emarginate, the spines rather slender, the outline of the fin rather strongly convex, fourth spine longest, $2\frac{1}{5}$ in head, tenth spine $3\frac{1}{4}$ in head; margin of soft dorsal gently rounded, the middle rays little longer than first rays, $2\frac{4}{7}$ in head; last ray not shorter than middle rays; caudal deeply forked, the upper lobe slightly longer than lower, $2\frac{1}{4}$ length of middle rays, which are $2\frac{1}{4}$ in head; upper lobe about as long as head; margin of anal nearly straight, the rays about of equal length, except the last, which is somewhat produced, $2\frac{1}{2}$ in head; first ray reaching about to base of last ray, when the fin is depressed; anal spines rather weak, the third rather longest, 3 in head; ventrals $1\frac{1}{2}$ in head; pectorals somewhat falcate, reaching first soft ray of anal, about as long as head. Color in life, dusky violet, paler below; mouth within and fins all similar in hue, the anal and ventrals with blackish tips; soft dorsal with some olive shades, the edge grayish. In spirits, nearly uniform dusky gray, paler below. Length 1 foot. West Indies. This beautiful little fish is rather common in the markets of Havana, from which locality came the specimen here described. (*dentatus*, toothed, the name not characteristic.)

Apsilus dentatus, GUICHENOT, in Ramon de la Sagra, Hist. Cuba, Poiss., 29, pl. 1, fig. 2, 1845, Havana; JORDAN & FESLER, *l. c.*, 455.
Mesoprion arnillo, POEY, Memorias, II, 154, 1860, Cuba.
Mesoprion dentatus, GÜNTHER, Cat., I, 188, 1859.
Tropidinius arnillo, POEY, Synopsis, 296, 1868.
Lutjanus arnillus, COPE, Trans. Am. Philos. Soc. 1869, 470.
Tropidinius dentatus, JORDAN & SWAIN, *l. c.*, 466.

530. APRION, Cuvier & Valenciennes.

Aprion, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 543, 1830 (*virescens*).
? *Chætopterus*, TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., 78, 1850 (*dubius*).
Pristipomoides, BLEEKER, Natuurk. Tijdschr. Nederl. Ind., III, 1852, 574 (*typus*).
Platyinius, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 237 (*vorax* = *macrophthalmus*).
? *Sparopsis*, KNER, Fische Mus. Godeffroy, 303, 1868 (*elongatus*).

Body oblong or rather elongate, compressed; scales large; mouth rather small, the canines inconspicuous; no teeth on tongue; dorsal fin rather short, the soft part not scaly, the fin not notched; skull essentially as in *Etelis*, the interorbital area flat, separated by a tranverse line of demarcation from the occipital, by which the median as well as the lateral crests are limited; frontals wide in front, and not cavernous; supraorbital margin crenate; periotic region much swollen outward and with the bones thin and polished; preorbital moderate; frontals behind with funnel-shaped foramina. *Aprion* has essentially the form of *Neomænis*, with the skull of *Etelis*. The American species is the type of the subgenus *Platyinius*, which agrees with *Aprion virescens* in the form of the skull, differing chiefly in the specific characters of deeper body, weaker teeth, and narrower preorbital. (*α*, without; *πρίων*, saw.)

Subgenus PLATYINIUS,* Gill.

1653. APRION MACROPHTHALMUS (Müller & Troschel).

(Voraz.)

Head 3; depth 3. D. X, 11; A. III, 8, scales 7–60–15, 52 pores. Body oblong-elliptical, moderately compressed; the back not greatly elevated; profile convex anteriorly, almost straight above eye; the nape again convex, its keel low and placed well back; snout rather blunt, 3⅗ in head; eye large, 3⅖ in head; interorbital space broad and flat, 4 in head; preorbital narrow, 7½ in head; mouth small, oblique; lower jaw slightly projecting; maxillary about reaching middle of eye, 2⅓ in head. Upper jaw with a narrow band of villiform teeth, outside of which is a row of larger teeth, the canines in front little differentiated; lower jaw with a single series of rather large teeth, scarcely large enough to be called canines; inside of this series is a comparatively wide band of villiform teeth in front of jaw only; a few larger teeth among the villiform teeth; tongue without teeth; vomer with a rather narrow Λ-shaped patch of teeth, without backward prolongation on median line. Gill rakers numerous, the longest about ⅖ diameter of eye, about 5 + 15. Preopercle with posterior margin almost straight and vertical, without emargination, very finely serrate above, the teeth coarser on angle and lower limb. Scales rather small, regularly arranged, the rows running parallel with the lateral line both above and below it; 7 rows of scales on the cheek, the scales of upper row not greatly enlarged, two rows on interopercle and 8 on opercle; temporal region with about 4 rows of large scales; top of head, snout, and jaws naked; base of soft dorsal and anal scaleless. Dorsal little emarginate, the spines rather slender, the outline of the fin moderately convex, third spine longest, 2⅗ in head, tenth spine 3 in head; margin of soft dorsal nearly straight, the first soft ray 3 in head, last ray exserted, 2 in head; caudal well forked, the upper lobe slightly longer than lower, 2⅖ length of middle rays, which are 3 in head; margin of anal similar to spinous dorsal, the last ray filamentous, 2½ in head; anal spines rather slender, the third slightly longer than second, 3¼ in head; ventrals 1½ in head; pectorals long and pointed, reaching to first soft ray of anal, 1$\frac{1}{10}$ in head. Color in life, rosy red with silvery luster, quite silvery below; faint pearly markings on scales of upper parts, these forming a decided stripe along base of dorsal; head all rosy, darker above; iris silvery; mouth white within; sides with pearly spots, faint and diffuse, irregularly scattered, each about as large as a scale; base of dorsal yellowish-olive, its edge scarlet, the fin otherwise rosy; caudal rosy, becoming scarlet behind; pectorals, ventrals, and anal slightly rosy. In spirits the bright colors all fade, leaving irregular pearly markings on a silvery ground. West Indies, generally common; the specimens here described from Havana, where it is rather common in the markets. (*μακρός*, large; *ὀφθαλμός*, eye.)

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* *πλατύς*, flat; *'ινίον*, nape.

* *Centropristis macrophthalmus*, MÜLLER & TROSCHEL in SCHOMBURGK, Hist. Barbados, 666, 1848, Barbados; young.
Mesoprion vorax, POEY, Memorias, II, 151, 1860, Cuba.
Platyinius vorax, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 237.
Elastoma macrophthalmus, COPE, Trans. Am. Philos. Soc. 1869, 468.
Aprion macrophthalmus, JORDAN & SWAIN, *l. c.*, 467; JORDAN & FESLER, *l. c.*, 456.

531. ETELIS, Cuvier & Valenciennes.

Etelis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 127, 1828 (*carbunculus*, a Japanese species).
Elastoma, SWAINSON, Nat. Hist. Fishes, II, 168, 202, 1839 (*oculatus*).
Hesperanthias, LOWE, Fishes of Madeira, 14, 1843 (*oculatus*).
Macrops, DUMÉRIL, Ichth. Analytique, 279, 1856 (*oculatus*).

Body elongate, covered with large scales; eye very large; preorbital very narrow; mouth moderate, the lower jaw projecting; canines in upper jaw only; no teeth on tongue or pterygoids; gill rakers long and slender. Dorsal fin deeply notched, rather short, its spines 10 in number, its soft rays not scaly; caudal very deeply forked; head naked above, skull with the interorbital area flat, separated from the occipital area by a transverse line, limiting the median and lateral crests, also; frontals wide in front, not cavernous, simply normally perforate; supraorbital margins crenate; periotic region little convex and with the bones thick, unpolished; prefrontals behind, with funnel-shaped foramina. The relationships of this genus have been repeatedly misunderstood, but, as Gill has shown, it belongs in the *Lutianidæ* and has no special affinity with *Anthias*, *Perca*, or *Serranus* † The synonymy and relations of this interesting genus have been well discussed by Dr. Gill in the paper above cited. In spite of the difference in the form of its dorsal, the relations of *Etelis* with *Aprion* are very close. The skulls in the two are almost identical, as has already been noticed by Poey and Gill. (ἔτελις, *etelis*, a name used by Aristotle for some fish not now recognized.)

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* According to Poey the *Centropristis macrophthalmus* of Müller & Troschel was based on the young of this species; if so, the latter name has the right of priority. This species agrees closely with the descriptions of *Aprion filamentosus* (Cuvier & Valenciennes) from the islands east of Africa, but it would be premature to unite 2 species from such widely separated localities without an actual comparison of specimens. Dr. Klunzinger regards the 2 species as identical. According to his account, however, *A. filamentosus* is a slenderer fish, the depth 4⅓ in the total length (3¾ in *A. macrophthalmus*), and the scales are 7-55-14, the caudal more deeply forked, the lobes 3 times the middle rays (2⅔ times in ours).

† See Gill, Proc. Ac. Nat. Sci. Phila. 1862, 447, for a discussion of the affinities of *Etelis*.

a. Maxillary scaly; depth $3\frac{1}{2}$ in length. OCULATUS, 1654.
aa. Maxillary naked; depth $2\frac{5}{6}$ in length. AQUILIONARIS, 1655.

1654. ETELIS OCULATUS (Cuvier & Valenciennes).

(CACHUCHO.)

Head $3\frac{1}{3}$; depth $3\frac{1}{2}$. D. X, 11; A. III, 8; scales 5–53–12, 50 pores. Body elongate, somewhat fusiform, moderately compressed; the back moderately elevated; caudal peduncle long and very slender; profile convex on snout, thence straightish to occiput; the nape low, not keeled; snout short, rather pointed, $3\frac{5}{6}$ in head; eye very large, 3 in head; preorbital very narrow, its least width 14 in head. Mouth moderate, oblique, the lower jaw projecting; maxillary reaching middle of eye, $2\frac{1}{10}$ in head, its surface scaly; interorbital space slightly concave, 4 in head, the supraorbital ridges prominent. Upper jaw with a narrow band of villiform teeth, outside of which is a row of moderate teeth, the two canines (sometimes duplicated) in front very sharp and projecting forward and downward, their length about 3 in diameter of pupil; lower jaw with villiform teeth in front of jaw only, the larger teeth of the outer row smaller and more numerous than in the upper jaw; canines of lower jaw not differentiated; tongue without teeth; vomer with a narrow Λ-shaped patch of teeth, bluntish in front and without backward prolongation on median line; no teeth on hyoid or pterygoid bones. Gill rakers long and slender, their length about $\frac{2}{5}$ diameter of eye, about 12 + 15. Posterior margin of preopercle almost straight and vertical, scarcely emarginate, very finely serrate; the teeth a little coarser at the angle. Scales rather large, the rows all running parallel with the lateral line; maxillary with about 12 scales; region behind eye well scaled; 7 rows of scales on cheek; 4 rows on interopercle, 2 on subopercle, and 8 on opercle; temporal region with about 4 rows of large scales; top of head and snout naked; lower jaw with a few embedded scales; bases of soft dorsal and anal scaleless. Spinous and soft dorsals connected; dorsal spines rather high and strong, the first spine short, $\frac{2}{7}$ length of second or longest spine, which is 2 in head, the spines thence becoming almost regularly and gradually shorter to last spine, which is little longer than first spine; margin of soft dorsal straight, the rays 3 in head, the last ray slightly elongate, its length $2\frac{1}{2}$ in head; anal similar to soft dorsal, its last ray considerably produced, its first soft rays when depressed reaching little beyond base of last ray; anal spines slender and regularly graduated, the third $3\frac{2}{3}$ in head; caudal very deeply forked, the upper lobe the longer, its length 4 times length of middle rays, which are $3\frac{1}{3}$ in head; upper lobe almost filamentous, longer than head; ventrals $1\frac{2}{3}$ in head; pectorals falciform, reaching almost to anal, $1\frac{1}{5}$ in head. Color in life, brilliant rose-red; bases of the scales deeper; sides and belly abruptly paler, rosy; mouth reddish within; lining of gill cavity reddish; fins all rosy; spinous dorsal and caudal bright red, the other fins paler. In spirits these colors fade, the fish becoming rosy white. Length 2 to 3 feet. West Indies to Madeira, not yet known from Florida; in rather deep water; generally common on rocky bottoms. The specimens here described from Havana. One of the most beautiful of fishes. A very similar species, *E. carbunculus* Cuvier & Valenciennes, occurs in the East Indies and north to Japan. As noticed by Temminck & Schlegel and by Steindachner, the published descriptions show no characteristic by which *E. oculatus* can be separated from *E. carbunculus*. It is, however, not safe to unite the two until actual comparison of examples can be made. (*oculatus*, "eyed," referring to the large eye.)

? *Etelis carbunculus*, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 127, 1828, Seychelles Archipelago.
Serranus oculatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., II, 266, 1828, Martinique.
Hesperanthias oculatus, LOWE, Fishes Madeira, 14, 1843.
Centropristis oculatus, MÜLLER & TROSCHEL in SCHOMBURGK, Hist. Barbados, 666, 1848.
Macrops oculatus, DUMÉRIL, Ichth. Analytique, 279, 1856.
Anthias oculatus, GÜNTHER, Cat., I, 92, 1859.
Etelis oculatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 447; JORDAN & SWAIN, *l. c.*, 469; JOBDAN & FESLER, *l. c.*, 457.

1655. ETELIS AQUILONARIS (Goode & Bean).

A second American species of this genus has been indicated in the following words:

A specimen (Cat. No. 37346, U. S. N. M.) obtained by the *Fish Hawk* has been misplaced and can not now be fully described.

A note indicates that the length of its head was equal to the height of its body, which is contained $2\frac{5}{6}$ times in the total length (without caudal). The diameter of the orbit is contained $3\frac{1}{6}$ times in the head. The maxillary bone was naked, rather than scaled as in *Etelis oculatus;* and the scales numbered 53 in the lateral line, 7 above and 14 below. The radial formula was D. X, 11; A. III, 8. A small specimen, possibly of the same species, was obtained by the *Blake*, off Dominica, at Station CVI, in 524 fathoms; but since this is less than 2 inches long, and the subject of the above note was 9, it is impossible to confirm the identification in the absence of the larger specimen. (Goode & Bean.) The larger number of scales above the lateral line would indicate that this species is allied to *Etelis* rather than to *Anthias*, with which it has not much in common. (*aquilonaris*, of the north wind; northern.)

Anthias aquilonaris, GOODE & BEAN, Oceanic Ichthyology, 238, 1896, Gulf of Mexico, Lat. 28° 36′ N., Long. 85° 33′ 30″ W.

532. VERILUS, Poey.

Verilus, POEY, Memorias, II, 125, 1860 (*sordidus*).

Body oblong, compressed, the caudal peduncle short and thick; head large, the skull largely cavernous and spongy in substance; eye very large; preorbital very narrow; mouth large, the chin projecting; canines moderate; tongue and pterygoids toothless; preopercle with a nearly entire membranous edge. Scales large. Dorsal deeply divided, the spines

9, the soft rays scaly at base; caudal short, forked. Color dusky purplish without, membranes black within. Interorbital space flat, formed as in *Etelis.* Frontals cavernous, with longitudinal osseus bars, leaving interspaces in front of transverse ridge and on each side near the front; supraorbital margins smooth; prefrontals behind with simple foramina for olfactory nerves. The genus is technically close to *Etelis,* although the single known species is very different from *Etelis oculatus.* The cavernous character of the skull is the most striking feature of the genus *Verilus.* One species, in very deep water. ("Veril, a Spanish word, meaning 'haut de fond coupé a pic,' apparently an allusion to the form of the teeth. 'Ne vous mettez pas en peine sur l'origine du nom, les meilleurs, ne sont pas les plus etymologiques, par cela même qu'ils ont une signification rarement exclusive.'"—Poey.)

1656. VERILUS SORDIDUS, Poey.

(Escolar Chino.)

Head $2\frac{3}{5}$; depth 3. D. IX, 10; A. III, 7; scales 4–43–9, 41 pores. Body oblong, compressed, rather robust; caudal peduncle short and thick; head large; profile almost straight from snout to origin of spinous dorsal, and not at all steep; snout very short and blunt, 4 in head; eye very large, $2\frac{7}{8}$ in head; interorbital space flat, its width $4\frac{2}{5}$ in head; occipital keel very low; preorbital very narrow, 7 in eye, nearly 20 in head; maxillary reaching middle of eye, 2 in head; mouth large, oblique, the lower jaw projecting; upper jaw with a rather broad band of villiform teeth, the outer row scarcely enlarged; 2 moderate canines in front of jaw, curved inward; lower jaw with a single series of teeth on sides, this series giving place to a very narrow villiform band in front, with 2 (sometimes duplicated) small canines directed nearly horizontally backward; vomer with a narrowly V-shaped patch of teeth, without backward prolongation on median line; tongue and pterygoids without teeth. Gill rakers numerous, their length almost half diameter of eye, 17 on the lower part of the arch, all developed. Preopercle with posterior margin weak and flexible, almost entire, becoming somewhat serrate at the angle and on lower limb; no distinct emargination, but the angle salient, membranaceous. Scales large, the rows horizontal below the lateral line; those above rather irregular, the series running upward and backward; head scaly everywhere, the scales generally smaller than on body; opercle with 3 rows of scales, very large, 1 row on subopercle; cheeks with many rows of scales, those in the middle very small; 1 or 2 rows on interopercle; bases of soft dorsal and anal somewhat scaly. Pseudobranchiæ large. Branchiostegals 7. Spinous and soft dorsals entirely separate; first spine $4\frac{1}{5}$ in second, which is $2\frac{1}{6}$ in head, the spines thence becoming gradually shorter to ninth spine, which about equals length of first spine; last rays of dorsal and anal not produced; margin of soft dorsal slightly concave, the anterior rays longest, $2\frac{1}{3}$ in head; anal similar to soft dorsal, its margin rather more concave, first soft rays extending beyond tips of last rays, when the fin is depressed; anal spines moderate, the third slightly longer than second, $2\frac{3}{4}$ in head; caudal fin short, broad, moderately forked, the upper lobe longer, its length scarcely twice that of middle rays, which are $2\frac{2}{5}$ in head; pectorals long, reaching to origin of anal, $1\frac{1}{5}$ in head; ventrals $1\frac{2}{3}$ in head. Color dusky gray, slightly paler below; tips of spinous dorsal and ventrals jet black, the fins otherwise colored as the body; posterior edge of caudal dusky; lining of gill cavity, peritoneum, and posterior part of mouth jet black. West Indies, very rarely taken in deep water off the coast of Cuba. It has never been seen elsewhere. The specimen above described was obtained in Havana. (*sordidus*, sordid, from the dull color, in contrast with the brightness of *Etelis oculatus*.)

Verilus sordidus, POEY, Memorias, II, 125, pl. 12, fig. 6, 1860, Cuba; POEY, Repertorio, II, 157, 1867; POEY, Synopsis, 291, 1868; POEY, Enumeratio, 32, 1875; JORDAN & FESLER, *l. c.*, 458.

533. XENOCYS, Jordan & Bollman.

Xenocys, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 160 (*jessiæ*).

This genus is closely related to *Xenistius*, from which it differs chiefly in having the dorsal fins entirely separated, the spinous part of 9 spines, its base containing that of soft dorsal $1\frac{1}{2}$ times; nostrils smaller and closer together than in *Xenistius;* teeth smaller; the fins more densely scaled and the occipital crest lower. The single species inhabits rocky shores in the eastern Pacific and is a fish of remarkably graceful form. (ξένος, strange; ὠχύς, swift.)

1657. XENOCYS JESSIÆ, Jordan & Bollman.

Head $3\frac{1}{2}$; depth $3\frac{2}{3}$. D. X–I, 13 or 14; A. III, 10 or 11; scales 8–51–15. Body narrowly but regularly elliptical, compressed; back little elevated; mouth rather large, somewhat oblique; lower jaw somewhat projecting; maxillary rather broad, reaching nearly to middle of pupil, $2\frac{2}{7}$ in head; eye large, its diameter greatest obliquely downward and backward, equal to snout, $3\frac{2}{5}$ in head; longitudinal diameter shorter than snout, $3\frac{4}{5}$ in head; preorbital rather narrow, its narrowest place $2\frac{2}{3}$ in eye, its edge entire, sheathing the edge of the maxillary for its whole length. Teeth very small, bands wider than in *Xenistius californiensis*, those on vomer in a Λ-shaped patch, but very small. Nostrils minute, close together, the anterior round, the posterior oblong. Serræ of preopercle at angle blunt, rather flat, none below, those on ascending limb smaller and sharper. Gill rakers long and slender, about 23 below angle. Opercle without spines. Cheeks and top of head with small scales; lower jaw and snout with rudimentary scales; maxillary naked; scales small, firm, ctenoid. Dorsal fins entirely separate, the interval between them about $\frac{4}{5}$ diameter of eye; dorsal spines rather high, slender, and pungent; the first short, the third and fourth of equal length, 2 in head, reaching when depressed to the tip of eighth; the second $\frac{2}{3}$ in third; soft dorsal longer than anal, its base about $\frac{4}{5}$ of an eye's diameter shorter than that of spinous dorsal; second anal spine noticeably shorter than third, which is almost 4 in head;

longest soft ray $2\frac{6}{7}$ in head; soft dorsal, anal and base of ventrals closely covered with small scales; caudal deeply forked, its peduncle slender, its upper lobe $1\frac{1}{7}$ in head; pectorals long, pointed, $1\frac{2}{3}$ in head; ventrals reaching slightly more than $\frac{3}{5}$ distance to vent, $1\frac{3}{5}$ in head; axillary scale of ventrals well developed. Color grayish-black above, silvery below, with about 7 distinct black, straight, parallel stripes on back and sides, which extend across opercles and cheeks, those above lateral line indistinct in old specimens; the upper stripes about as wide as the interspaces, the lower narrower; top of head with distinct stripes; fins dusky, except the ventrals. Length about a foot. Galapagos Islands; locally common; a remarkably graceful and active fish. (Named for Mrs. Jessie Knight Jordan.)

Xenocys jessiæ, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 160, Charles Island, Galapagos Archipelago (Type, No. 41166, U. S. N. M. Coll. *Albatross*); JORDAN, Proc. Cal. Ac. Sci. 1896, 220, pl. 24.

534. XENISTIUS, Jordan & Gilbert.

Xenistius, JORDAN & GILBERT, Synopsis, 920, 1883 (*californiensis*).

This genus is closely related to *Xenichthys*, but it is remarkably distinguished by the relative development of the vertical fins, the soft dorsal and anal being similar to each other and shorter than the spinous dorsal. One species known. (*ξένος*, strange; *ἱστίον*, sail, dorsal fin.)

1658. XENISTIUS CALIFORNIENSIS (Steindachner).

Head 3 to $3\frac{1}{3}$; depth 3 to $3\frac{1}{3}$. D. XI–1, 12; A. III, 10; scales, 7–52–13. Body oblong-elliptical, the back a little elevated; head compressed; mouth moderate, terminal, very oblique, the lower jaw strongly protruding; maxillary narrow, reaching front of pupil, $2\frac{1}{2}$ in head; eye large, $3\frac{1}{4}$ to $3\frac{1}{2}$ in head, the eye smaller and the bones of the head firmer than in *Xenichthys xanti;* teeth small, sharp, in very narrow bands, those on vomer in a Λ-shaped patch, but so small as to be scarcely appreciable; preopercle with fine sharp serræ; nostrils small, round. Gill rakers long and slender, 11 + 15 to 20; scales small, firm; dorsal fins almost separate; spines slender but pungent; third and fourth dorsal spines longest, $1\frac{3}{4}$ in head, the others gradually shortened; soft dorsal and anal similar to each other, short, shorter than spinous dorsal, the anterior rays much higher than in the species of *Xenichthys;* first soft ray of anal 3 in head; soft dorsal and anal scaly; pectoral fins rather long, $1\frac{1}{3}$ in head, not reaching vent; color bluish above, silvery below; continuous dark orange brown stripes on upper part of body, 3 above lateral line, 3 or 4 below; upper fins dusky, lower mostly pale. Length about a foot. Pacific coast of America from San Diego southward to La Paz and Guaymas; rather common southward; a pretty and interesting fish.

Xenichthys californiensis, STEINDACHNER, Ichth. Beiträge, III, 3, 1875, San Diego; JORDAN & GILBERT, Synopsis, 547.

Xenistius californiensis, JORDAN & FESLER, Review Sparoid Fishes, 460, 1893.

535. XENICHTHYS, Gill.

Xenichthys, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 82 (*xanti*).

Body elongate, subfusiform, compressed; head conic, little compressed; eyes large, anterior; preorbital narrow, oblique; preopercle serrate; mouth small, very oblique; chin much projecting, a pore on each side of the symphysis; teeth very small, recurved, in narrow bands in each jaw; vomer with a rhomboid patch of very minute teeth; palatines and tongue nearly or quite toothless; branchiostegals 7. Scales small, firm, ctenoid. Dorsal fins nearly separate, the spines, 10 in number, slender but rigid, received in a groove; anal with 3 graduated spines; soft dorsal and anal long, low, each with about 18 soft rays, longer than the spinous dorsal; caudal emarginate; axillary scale present. Two species. Eastern Pacific. (*ξένος*, strange; *ἰχθύς*, fish.)

a. Pectoral fin falcate, about as long as head and reaching to front of anal fin; color nearly plain silvery. AGASSIZII, 1659.

aa. Pectoral fin short, 1½ in head, and not reaching nearly to vent; color silvery with faint longitudinal streaks. XANTI, 1660.

1659. XENICHTHYS AGASSIZII, Steindachner.

Head 3; depth 3. D. XI–I, 17 or 18; A. III, 17; scales 56. Pectoral fin falcate, about as long as the head, and reaching to front of anal fin; eye very large, 2⅘ in head; snout broad and flat; mouth oblique, the maxillary 2⅘ in head; teeth quite small, those on vomer scarcely developed; none on palatines or tongue; lower jaw much projecting; preopercle very finely serrulate. Gill rakers slender and rather long, X + 17; nostrils small, oblong, the longest ⅔ pupil; body compressed, the back somewhat elevated; longest dorsal spine not ½ length of head; soft dorsal and anal low, covered with small scales; caudal forked; anal spines short, graduated, the second stouter; first soft ray of anal less than ⅓ head. Color steel-blue above, silvery below. Galapagos Islands; not common; the above description from one of the original types. (Named for Louis Agassiz.)

Xenichthys agassizii, STEINDACHNER, Ichth. Beiträge, III, 6, 1875, Galapagos Islands; JORDAN & FESLER, *l. c.*, 461.

1660. XENICHTHYS XANTI, Gill.

Head 3; depth 3. D. XI–I, 18; A. III, 17; scales 10-54-14. Form elliptical, the body comparatively deep, compressed, the back somewhat elevated; profile nearly straight from snout to base of dorsal; head subconic, flattish above, not strongly compressed; the temporal region prominent; post-temporal, interorbital, and suborbital regions somewhat cavernous, yielding to the touch; nuchal region slightly carinate; mouth terminal, very oblique, the lower jaw strongly projecting, its tip entering the upper profile of head; preorbital rather narrow, its least width less than ½ the diameter of the pupil. Teeth small and feeble, in narrow bands in both jaws, a few on vomer, none on palatines or tongue. Nostrils similar, near together, oblong, more than twice as long as broad (nearly round in *X. californiensis*). Preorbital region, upper jaw, and tip of lower jaw naked; rest of head scaly. Edge of preorbital entire. Eye extremely large, ½ longer than snout, which is somewhat longer than the width of the flat interorbital space; diameter of head 3 in length of head. Preopercle produced and membranaceous at its angle, its vertical limb with weak, sharp teeth. Gill rakers moderate, about ½ diameter of pupil, 6 + 14. Scales moderate, thin, somewhat ctenoid, those of the breast like the others; scales on breast and back somewhat reduced. Dorsal spines high, flexible, the third highest, as long as snout and eye, or 1⅓ in head, 5⅓ in length of body; tenth dorsal spine very low; eleventh and twelfth a little higher; soft dorsal long and low, its highest rays less than diameter of orbit, its base ¾ length of head, slightly longer than base of soft dorsal, equal to base of anal; anal spines small, graduated, the third ⅔ height of the soft rays; caudal moderately and equally forked, the middle rays ⅔ length of outer; length of the fin more than length of snout and eye; pectoral short, not reaching nearly to vent, a little longer than snout and eye, or 1½ in head; ventrals not nearly reaching vent, 1¾ in head, their accessory scale well developed; vertical fins with well-developed sheaths of scales; anal entirely scaly; soft dorsal, pectorals, and ventrals mostly covered with scales; caudal partly scaled. Coloration in life: Back bluish-gray, below silvery; upper part of sides with 7 or 8 longitudinal, narrow, yellowish-brown streaks, some of which are continued very faintly on the head; snout blackish above, yellowish on sides; mouth light yellow within, with tip of tongue and membrane of lower jaw blackish anteriorly; eye with a dusky yellowish streak surrounding the iris; spinous dorsal yellowish below, dusky toward the margin; other vertical fins yellowish, with some scattered black points and with narrow black margins; pectorals yellowish, the membrane with series of dark points between the rays; ventrals white, with a dusky yellow blotch on the outer ½ of outer rays. Young with two dark longitudinal stripes and a faint dusky spot at base of caudal. Here described from the types of *Xenichthys xenops*, 10 inches long, from Panama. Pacific coast of tropical America; from Cape San Lucas to Panama; common southward. (Named for John Xantus de Vasey, who made a remarkably valuable collection of fishes at Cape San Lucas.)

Xenichthys xanti, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 82, Cape San Lucas; young; JORDAN & FESLER, *l. c.*, 461.

Xenichthys xenops, JORDAN & GILBERT, Bull. U. S. Fish Com. 1881, 325, Panama; adult. (Types, Nos. 29173 and 29513. Coll. Gilbert.)

536. NEMIPTERUS, Swainson.

Nemipterus, SWAINSON, Nat. Hist. Fishes, etc., II, 223, 1839 (*filamentosus*).

Synagris, GÜNTHER, Cat. Fish. Brit. Mus., I, 373, 1859 (*furcosus*); not *Synagris*, Bleeker.

Dentex, BLEEKER, Systema Percarum Revisum, 278, 1875 (*filamentosus*); not of CUVIER, whose type is *Dentex dentex*.

This genus contains some 20 species, very closely allied to the European genus *Dentex*, from which they are distinguished by the larger scales, smaller mouth, and fewer dorsal spines, all characters of minor importance. All are Asiatic, except the one very imperfectly described species said to have been taken in our waters. (*νῆμα*, thread; *πτερόν*, fin.)

1661. NEMIPTERUS MACRONEMUS (Günther).

Head 4; depth $3\frac{3}{4}$ (with caudal). D. X, 9; A. III, 7. First dorsal spine, upper lobe of caudal, and first ray of ventral, produced in long filaments. Color red (Cuvier & Valenciennes). This species is known only from the original type, a young specimen said to have been sent by Diepering from Surinam, but which may be really from the East Indies. *Nemipterus macronemus* agrees very closely with *Nemipterus nematophorus*, Günther, from Sumatra. According to Bleeker the chief differences are these, that in *macronemus* but 1 dorsal spine is filamentous, in *nematophorus* 2; in *macronemus* the fins are more pointed. All these are doubtful characters, and it may well be that *Nemipterus macronemus* came from Sumatra rather than from Surinam. Collections from the Dutch East Indian and West Indian colonies have been repeatedly mixed in European museums. (*μακρός*, long; *νῆμα*, thread.)

Dentex filamentosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 254, pl. 155, 1830, Surinam; not *Cantharus filamentosus*, Rüppell, also a *Nemipterus*.
Synagris macronemus, GÜNTHER, Cat., I, 380, 1859, Surinam; after CUVIER.
Nemipterus macronemus, JORDAN & FESLER, *l. c.*, 505.

Family CL. HÆMULIDÆ.

(THE GRUNTERS.)

Body oblong, or more or less elevated, covered with moderate-sized, adherent scales, which are more or less strongly ctenoid or almost cycloid; lateral line well developed, concurrent with the back, usually not extending on the caudal fin; head large, the crests on the skull usually largely developed; no suborbital stay; mouth large or small, usually terminal, low, and horizontal; premaxillaries protractile, their spines not greatly produced backward; maxillary without supplemental bone, for most of its length slipping under the edge of the preorbital, which forms a more or less distinct sheath; preorbital usually broad, no barbels; teeth all pointed, none of them forming marked canines; no teeth on the vomer, palatines, and tongue; lower pharyngeals separate, with pointed teeth; gills 4, a large slit behind the fourth; pseudobranchiæ large; gill rakers moderate; gill membranes separate, free from the isthmus; preopercle serrate or entire; opercle without spines; sides of head usually scaly; dorsal fin single, continuous or deeply notched, sometimes divided into 2 fins, the spines usually strong, depressible in a groove; the spines heteracanthous, that is, alternating, the one stronger on the right side, the other on the left, the spines usually 10 to 12 in number; anal fin similar to the soft dorsal, and with 3 spines; ventral fins thoracic, the rays I, 5, with a more or less distinct scalelike appendage at base; caudal fin usually more or less concave behind; air bladder present, usually simple; stomach cœcal; pyloric cœca few; vertebræ usually $10 + 14 = 24$. Branchiostegals usually 6 or 7. Cranium with its muciferous system moderately developed or rudimentary. Intestinal canal short. Carnivorous fishes of the warm seas, most of them valued as food. Genera about 15; species nearly 150. The group is very close to the *Lutianidæ* on the one hand and to the *Sparidæ* on the other, while some of its members show affinities with some *Sciænidæ* and *Serranidæ*. (*Pristipomatidæ*, Günther, Cat., I, 272–337.)

a. Chin with a central groove behind the symphysis of the lower jaw.
  b. Mouth more or less wide, the jaws scarlet posteriorly in life; soft parts of vertical fins densely scaly to their margins.
    c. Scales above lateral line arranged in very oblique series, not parallel with the lateral line.
      d. Jaws subequal, or the lower included; mouth little oblique; gill rakers comparatively few and short.
        e. Dorsal spines 12, rarely 11; scales large; gill rakers few and small (10 to 14 on lower part of anterior arch); frontal foramen a single or divided slit at the base of the high supraoccipital crest in front.
          f. Mouth moderate or large, its cleft more than ⅓ length of head; back more or less elevated; second anal spine strong, notably longer than third. HÆMULON, 537.
          ff. Mouth small, its cleft less than ⅓ length of head; body rather elongate; second anal spine small; back and sides with longitudinal yellow stripes; teeth weak; gill rakers rather few and small; snout very short, 2⅔ in head; frontal foramina separate and placed some distance in front of the very low supraoccipital crest; premaxillary spine very short, 4¼ in head. BRACHYGENYS, 538.
        ee. Dorsal spines 13; anal fin low; preorbital low; gill rakers in moderate or rather large numbers, 12 to 18 on lower part of arch; lower jaw not projecting; mouth little oblique; body comparatively elongate, the depth 2¾ to 3½ in length; body with longitudinal yellowish stripes; scales rather small; frontal foramina long divided slits in front of supraoccipital crest; size small. BATHYSTOMA, 539.
      dd. Lower jaw projecting beyond upper; snout very short; gill rakers comparatively long and slender, about 22 on lower part of anterior arch; frontal foramina 2 short slits close together just in front of the high supraoccipital crest; dorsal spines 12 or 13. LYTHRULON, 540.
    cc. Scales above lateral line arranged in longitudinal series, which are throughout parallel with the lateral line; dorsal spines 13 or 14; frontal foramina narrowly oval, wholly separate, some distance in front of the low supraoccipital crest; premaxillary spine short, 3⅓ in head; lower jaw projecting. ORTHOSTŒCHUS, 541.
  bb. Mouth more or less narrow, not scarlet within; soft fins naked or with scales on their basal parts.
    g. Anal fin short, its rays III, 7 to III, 10; dorsal fin more or less emarginate, its spines rather robust.
      h. Body ovate, the back elevated; depth greater than length of the head; outer teeth of upper jaw enlarged; lips thick; second anal spine strong; soft rays of dorsal and anal scaly at base. ANISOTREMUS, 542.
      hh. Body oblong, the depth usually less than length of head; lips not very thick; scales large, those above lateral line in series mostly parallel with lateral line.
        i. Preopercle very sharply serrate, the serræ at angle much enlarged, those below angle turned forward; outer teeth in both jaws considerably enlarged; soft rays of dorsal and anal more or less scaly; second anal spine enlarged. CONODON, 543.

ii. Preopercle finely serrate, the serræ at the angle scarcely enlarged, those below not antrorse; teeth subequal, or the outer in upper jaw somewhat enlarged; gill rakers very short and weak.

j. Soft part of dorsal and anal with series of small scales on the membranes behind each ray; anal spines small or moderate, the second little, if any, longer or stronger than third; anal lower than the soft rays; body oblong, not elevated; scales above lateral line parallel with the back; dorsal spines 12, the soft rays 15 or 16; outer teeth of upper jaw slightly enlarged. BRACHYDEUTERUS, 544.

jj. Soft parts of dorsal and anal scaleless, except a low sheath at base; anal spines strong, the second much longer and stronger than third; dorsal spines 12 or 13, the soft rays 12 to 14. POMADASIS, 545.

gg. Anal fin long and low, its rays III, 10 to III, 13; dorsal fin low, usually not deeply emarginate; anal spines small; preopercle finely serrate or entire; outer teeth of jaws slightly enlarged; gill rakers moderate, rather slender.

k. Dorsal spines 12 or 13.

l. Scales of body without series of small accessory scales at base; soft dorsal and anal naked or somewhat scaly; mouth small; temporal crest, which rises from behind the eye, very low and inconspicuous, the upper edge below base of the high supraoccipital crest, which originates over the pupil. ORTHOPRISTIS, 546.

ll. Scales of body each with a cluster of small accessory scales at base; soft dorsal and anal with series of small scales on the membranes. ISACIELLA, 547.

kk. Dorsal spines 14; scales very small; soft dorsal and anal naked; skull very broad and rounded, interorbital area wider than length of snout; preorbital very narrow; the temporal crest, which rises above the pupil, rather high, its top above middle of height of supraoccipital crest, which originates over front of pupil. MICROLEPIDOTUS, 548.

aa. Chin with pores, but with no central groove at the symphysis; preopercle finely serrate.

m. Anterior profile concave above the eye; snout gibbous; outer teeth in both jaws enlarged and blunt (appearance of *Anisotremus*); gill rakers small and slender; anal fin rather long, soft dorsal and anal scaleless. GENYATREMUS, 549.

537. HÆMULON,* Cuvier.

(RONCOS OR GRUNTS.)

Diabasis, DESMAREST, Première Décade Ichthologique, 34, 1823 (*parræ*=*flavolineatus*); not *Diabasis* of HOFFMANSEGG, a genus of *Coleoptera*, 1819.

Hæmulon, CUVIER, Règne Animal, Ed. 2, II, 175, 1829 (*elegans*, etc.; restricted later to *elegans*=*sciurus*).

Anarmostus (SCUDDER MS.) PUTNAM, Bull. Mus. Comp. Zool., I, 12, 1863 (name only; *flavolineatum*, etc.); name preoccupied in insects, *Anarmostus*, LOEW, 1860.

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* All the species of *Hæmulon* are American. All the species have more or less of orange on the inside of the mouth, a trait of coloration not found in *Pomadasis*. The amount of redness is greatest in those species having the largest mouth. The young fishes in this group differ in proportion considerably from the adults. Besides the changes usual in other fishes, we may observe that in *Hæmulon* the young have the snout proportionately much shorter, so that the maxillary, although also much shorter in proportion, extends further back in comparison with the eye. Nearly all the species have, when young, two or more more or less sharply defined, dark, longitudinal stripes along the side, one or more along the top of the head, and a dark spot at the base of caudal. These markings persist longer in some species than in others, but traces of them at least may be found in the young of nearly all the species of *Hæmulon* and *Pomadasis*. In a few species these markings persist during life.

Body oblong, usually more or less elevated; mouth wide, the maxillary long and curved, reaching to below the eye, its tip extending to the posterior end of the preorbital; chin with a central groove behind the symphysis; lower jaw included; gill rakers moderate; no teeth on vomer or palatines; teeth of the jaw conical, the outer series stronger, curved; lips and inside of mouth posteriorly commonly bright red or scarlet in life; preopercle serrate, with no recurved hooks below; soft parts of the vertical fins completely covered with scales; scales about lateral line in series not parallel with lateral line; a marked angle formed at the junction of the spinous and soft parts of the dorsal; dorsal spines 12 or 11; second anal spine enlarged, generally large and longer than the third; caudal forked. (*αἷμα*, blood; *οὖλον*, the singular of *οὖλα*, the gums.)

a. Scales below lateral line anteriorly not especially enlarged.

b. Scales above lateral line anteriorly not much enlarged.

c. Maxillary $2\frac{1}{3}$ to $2\frac{3}{4}$ in head, not reaching center of eye (in adult).

d. Back and sides without yellow or blue stripes; each scale above with a median blackish spot, these forming undulating lines (spots rarely obsolete in adult, obscure or wanting in young); maxillary $2\frac{1}{2}$ to $2\frac{3}{4}$ in head.

e. Scales in a vertical row from first dorsal spine to lateral line, 7 or 8 (9 in oblique series).

f. Mouth rather small, maxillary scarcely reaching to front of eye; back elevated; preorbital very deep, its least breadth greater than length of eye in adult, $4\frac{1}{8}$ to $4\frac{2}{3}$ in head in young; second anal spine not reaching to tip of last ray; snout long and pointed, $2\frac{1}{4}$ to $2\frac{3}{4}$ in head.

g. Sides with about 6 dark vertical bars; sides of head with blackish spots like those of body; dorsal spines not graduated; second anal spine when depressed not reaching tip of last spine. Head 3; depth $2\frac{2}{5}$; scales 7-51-14; D. XII, 17; A. III, 9. SEXFASCIATUM, 1662.

gg. Sides without dark bars; head unspotted; dorsal spines graduated; second anal spine, when depressed, reaching beyond tip of last spine. Head 3; depth $2\frac{2}{3}$; D. XII, 16; A. III, 7; scales 7 (or 8)-46 to 48-16. ALBUM, 1663.

ff. Mouth rather large, maxillary reaching front of pupil; back little elevated; preorbital rather narrow, its least width 5 in head; second anal spine reaching tip of last ray; snout rather long and pointed, $2\frac{1}{3}$ in head; back and sides with 4 or 5 black longitudinal streaks, which disappear only in very old examples. Depth $2\frac{3}{4}$. MACROSTOMUM, 1664.

ee. Scales in a vertical row from first dorsal spine to the lateral line, 5 or 6.

h. Series of scales from scapular scale extending backward to front of soft dorsal; snout rather long and pointed; mouth small; the maxillary $2\frac{3}{4}$ to 3 in head; pectoral fins long, $\frac{3}{4}$ length of head; black spots on sides coalescing in continuous stripes. BONARIENSE, 1665.

hh. Series of scales from scapular scale not extending farther backward than the middle of spinous dorsal; snout shorter, not very acute; mouth larger, the maxillary about $2\frac{1}{2}$ in head; premaxillary processes about 3 in head; dark spots on scales not coalescent.

i. Depth of body about 2⅔ in length; pectoral fins short, less than ⅔ length of head; scales above lateral line scarcely enlarged. Head 3; depth 2⅔; scales 6–50–14; D. XII, 14; A. III, 7. PARRA, 1666.

ii. Depth of body 2½ in length; pectoral fins long, more than ⅞ length of head; scales above lateral line somewhat enlarged (in adult). Head 3⅛; depth 2½; scales 5–49–13; D. XI or XII–16 or 15; A. III, 7. SCUDDERI, 1667.

dd. Back and sides with distinct horizontal yellow stripes, fading but not disappearing in spirits; no black spots anywhere; vertical fins usually dusky yellow; scales of sides slightly enlarged; maxillary 2⅓ in head, reaching front of pupil; body not very deep; snout short, not ⅓ length of head; second anal spine when depressed reaching tip of last ray, its length about ½ head. CARBONARIUM, 1668.

cc. Maxillary nearly or quite ½ length of head, reaching center of eye in adult; no black spots or stripes anywhere in the adult (except under angle of preopercle).

j. Back and sides with rows of round silvery spots, one on each scale, these forming streaks which follow the direction of the rows of scales; ground color light olive-brown; anal high; a black blotch at base of caudal; fins all yellow; body rather elongate; the snout pointed; maxillary about 2⅕ in head; second anal spine 2⅓ in head. Head 3; depth 2⅚; scales 7–50–14; D. XII, 16; A. III, 8. STEINDACHNERI, 1669.

jj. Back and sides with continuous yellow stripes, which are horizontal and do not everywhere follow the direction of the rows of scales; ground color bluish-gray; back with a well-defined blackish area from first dorsal spine to base of caudal, this color covering most of soft dorsal and middle of caudal lobes; body rather elongate; snout moderate; second anal spine 2¾ in head. Head 3; depth 3; scales 7–56–17; D. XII, 16; A. III, 8. MELANURUM, 1670.

jjj. Back and sides of head and body with continuous blue stripes, horizontal, and not everywhere following the rows of scales; ground color bright yellow; fins yellow, the caudal dusky at base; snout moderate; teeth strong, the anterior caninelike; second anal spine 2½ in head. Head 2¾; depth 2⅗; scales 7–53–14; D. XII, 16; A. III, 8. SCIURUS, 1671.

bb. Scales above lateral line anteriorly much larger than the other scales; sides of head with bright blue stripes, which extend for a short distance only on body; body without distinct markings; mouth very large, its cleft more than ½ head (in adult); premaxillary processes 2½ in head; anterior profile somewhat concave, the snout sharp, projecting; anal rather high, its second spine 2½ in head. PLUMIERI, 1672.

aa. Scales below lateral line anteriorly much enlarged; head, back, and sides with continuous bright yellow stripes, those below following the direction of the scales, and therefore extremely undulating for the most part; body with 2 longitudinal black lines, the lower running from snout to base of caudal, ending in a black spot, the upper commencing in front of nostrils and separated from preceding by a pale band, extending backward to posterior end of soft dorsal; region in front of dorsal with black median line; other short black lines on head; black spot at angle of preopercle purplish-silvery in spirits; fins yellow; posterior teeth caninelike; body rather deep; snout short; mouth not large, the maxillary 2⅓ in head; anal high, its second spine 2 in head. FLAVOLINEATUM, 1673.

1662. **HÆMULON SEXFASCIATUM**, Gill.

(MOJARRA ALMEJERO.)

Head 3; depth 2⅖. D. XII, 17; A. III, 9; scales* 6–51–14. Form of *H. album*. Body comparatively deep, the back elevated and compressed, the anterior profile steep and nearly straight from tip of snout to above eye, where a slight angle is formed, thence rising more steeply and forming a somewhat steep curve before the dorsal; snout pointed, of moderate length, 2¾ in head (in specimen 8 inches in length); proportionately longer in the adult. Mouth not very large, the maxillary reaching front of eye in young (8 inches), not nearly reaching eye in adult, its length 2½ to 2¾ in head; lower jaw included. Teeth rather slender, the antrorse teeth of posterior part of lower jaw inconspicuous. Eye small (4½ in head in young of 8 inches). Interorbital space convex, about 4 in head; preorbital deep, its least depth greater than length of eye in adult, 4⅔ in head in young (8 inches); preopercle finely and rather sharply serrate. Gill rakers small, about 8 + 12. Scales moderate, those above lateral line not enlarged, arranged in very oblique series; those below lateral line also not enlarged, their series more nearly horizontal; soft fins scaled, as usual. Dorsal spines rather slender, the fourth highest, 2 in head; longest soft rays 3 in head; caudal lobes subequal, 1⅓ in head; longest anal rays high, 2⅓ in head; second anal spine longer and a little stronger than third, its tip when depressed about reaching middle of last anal ray, its length 2^3 in head; free margin of anal somewhat concave, the tips of the first rays when depressed reaching tips of last rays; ventral fins 1½ in head; pectorals 1¼. Frontal foramen a single divided slit in front of the high supraoccipital crest as in other species of the subgenus *Hæmulon*. Color pearly grayish, with 6 or 7 sharply defined dusky cross-bands from back to lower part of sides, fading below, these of nearly equal width, and, except the sixth and seventh, of about equal distinctness, and extend slightly backward below; they are rather wider than eye and about equal to the paler interspaces; the first is at the nape, extending to base of pectoral; the second under front of spinous dorsal; the third near middle of spinous dorsal; the fourth under last spines; the fifth and sixth under soft dorsal; the seventh, when evident, on caudal peduncle; cheeks, opercles, and anterior part of sides with distinct roundish spots of brownish-black, these largest and best defined on the opercle; fins nearly plain dusky grayish. Here described from No. 30997, U. S. Nat. Mus., from Colima, 8 inches in length. Pacific coast of tropical America, Guaymas to Panama; not very abundant, but widely distributed. This species is the Pacific coast representative of *H. album*, from which it differs strikingly in its coloration. It reaches a similar very large size, specimen of over 2 feet in length having been obtained at Mazatlan by Gilbert and by Jordan. (*sex*, six; *fasciatus*, banded.)

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*In this genus the scales above the lateral line are counted vertically from the first dorsal spine to the lateral line; those below the lateral line from the first anal spine obliquely upward and forward to the lateral line. The scales in a longitudinal series are, as here given, the number of vertical rows above the lateral line from head to base of caudal. This number is practically the same in all species of the genus, the variations above or below 50 being slight. The number of oblique series of scales or of pores in the lateral line is in all cases about 10 fewer, or about 40.

Hæmulon sexfasciatus, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 254, Cape San Lucas (Coll. Xantus).
Hæmulon maculosum, Peters, Berliner Monatsberichte, 705, 1869, Mazatlan.
Hæmulon sexfasciatum, Jordan & Swain, *l. c.*, 288, 1884; Jordan & Fesler, *l. c.*, 469.

1663. **HÆMULON ALBUM**, Cuvier & Valenciennes.

(Margate-fish; Jallao; Margaret Grunt.)

Head 3; depth $2\frac{2}{3}$. D. XII, 16; A. III, 7; scales 7 or 8–46 to 48–16. Body comparatively deep, the back more elevated and more sharply compressed than in any other of our species, the anterior profile steep and nearly straight from tip of snout to above eye, where a slight angle is formed, the profile thence rising more steeply and forming a somewhat steep curve before the dorsal. In most specimens, especially the larger ones, the concavity above the eye is well marked, not, however, in all. Snout long, pointed, its length $2\frac{1}{4}$ to $2\frac{2}{5}$ in head; ventral outline nearly straight; caudal peduncle rather long. Mouth large, the maxillary extending to front of eye, its length $2\frac{2}{5}$ to $2\frac{3}{5}$ in head, lower jaw included. Teeth not very large, in narrow bands, the antrorse teeth of the posterior part of lower jaw less developed than in some other species; eye small, 5 to 7 in head; interorbital space strongly convex, its width $3\frac{3}{4}$ in head; preorbital deep, its least breadth $4\frac{1}{8}$ in head; preopercle finely but sharply serrate, the teeth coarser above. In most of the specimens these serrations are distinct, but in one, not otherwise peculiar, they are scarcely distinguishable. Gill rakers rather small, about 12 below the angle. Scales moderate, those above lateral line not enlarged, arranged in very oblique series; those below more nearly horizontal; soft parts of dorsal and anal covered with thin translucent scales. Dorsal spines rather slender, the fourth highest about $2\frac{1}{5}$ in head; longest soft rays 5 in head; caudal lobes subequal, $1\frac{1}{6}$ in head; anal moderate, its longest rays 4 in head; second anal spine stronger and longer than third, $3\frac{1}{5}$ in head, reaching past base of the last ray when depressed; first soft rays when depressed not reaching tips of last rays; ventrals $1\frac{2}{3}$ in head; pectorals $1\frac{1}{2}$. Bones of head usually cavernous; mucous canal around preopercle and lower jaw very large; supraoccipital ridge high, extending forward to middle of pupil; temporal crests very low and thin, not extending forward quite to end of supraoccipital crest. Color in life of adult fishes ($1\frac{1}{2}$ to 2 feet in length) pearly white, somewhat olivaceous above, where a few of the scales have very faint dark spots at their bases; still fainter spots visible along the scales of lower part of sides; mouth orange within; lips and a faint blotch on each side of snout light yellow; a dusky shade under edge of preopercle (much more distinct in young); fins all light olive; the soft dorsal somewhat dusky; head without stripes or spots. Young more distinctly spotted, the spots small, round, blackish, each with a pearly edge; one under each scale of back and sides very distinct when the fish is alive, or after its scales are removed, but disappearing almost entirely with death. In life a broad, dusky, lateral band is also distinct, but all traces of this disappear with death. The Cuban specimens are more dusky in color and less distinctly spotted; the coloration above rather brassy than pearly. West Indies; Florida Keys to Brazil; reaches a length of 2 feet or more, and is an important food-fish at Key West, Havana, Nassau, St. Thomas, and Jamaica. (*albus*, white.)

Perca marina gibbosa (Margate-fish), CATESBY, Nat. Hist. Car., 2, pl. 2, 1742, Bahamas.

Perca gibbosa, WALBAUM, Artedi Pisc., 348, 1792; after CATESBY; not *Perca gibbosa*, LINNÆUS, which is *Eupomotis gibbosus*.

Calliodon gibbosus, BLOCK & SCHNEIDER, Syst. Ichth., 312, 1801; after CATESBY.

Hæmulon album, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 241, 1830, St. Thomas; JORDAN & FESLER, *l. c.*, 469, 1893.

Hæmulon microphthalmum, GÜNTHER, Cat., I, 306, 1859, America.

Hæmulon gibbosum, JORDAN & SWAIN, *l. c.*, 290, 1884.

1664. HÆMULON MACROSTOMUM, Günther.

(GRAY GRUNT; STRIPED GRUNT.)

Head 2⅘; depth 2¾. D. XII, 16; A. III, 8; scales 7-51-13 (9 above in an oblique series). Body oblong, moderately compressed, the anterior profile almost straight; snout rather long and pointed, its length 2⅓ in head; eye large, 3⅘ in head; mouth rather large, the maxillary reaching front of pupil, 2⅙ in head; least width of preorbital about 5 in head. Teeth moderate, the outer row in the upper jaw and the posterior teeth in both jaws considerably enlarged. Preopercle moderately serrate. Gill rakers small. Scales moderate, those above lateral line not enlarged; those below very slightly enlarged; scales above arranged in very oblique series, the series below oblique anteriorly, becoming horizontal posteriorly. Dorsal spines strong, the longest 2¼ in head; soft dorsal rather high; caudal lobes subequal, 1⅔ in head; anal spines strong, the second longest and strongest, 2⅔ in head, its tip reaching, when depressed, beyond tip of last ray; soft anal very high, its free margin concave, its longest ray 2⅗ in head, reaching much beyond tip of last ray; pectorals 1⅗ in head; ventrals 1⅔. Color in spirits, pearly gray, with conspicuous narrow dark streaks, arranged essentially as in the young of all the other species of *Hæmulon*, but in this species persistent through life; a median streak from tip of snout to dorsal, 1 from snout above eye, along sides of back to last ray of soft dorsal, 2 below this from eye above to last ray of soft dorsal, the upper one more or less interrupted behind; a fourth streak from eye nearly straight to base of caudal; traces below this of a fifth streak; a short streak fom eye to gill opening, between the third and fourth streaks; this is continued on the body in a series of irregular marks and dots; a large black blotch on opercle under angle of preopercle; fins all dusty olive, the pectorals palest; ventrals darkest.* Here described from No. 26555, U. S. N. M., from Key West. West Indies, north to Florida Keys and Clearwater Harbor. Not very common. (*μακρός*, long; *σ͂τόμα*, mouth.)

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*We have examined specimens of this species from Clearwater Harbor, Key West, Jamaica, and St. Thomas. The large specimen from St. Thomas, a foot in length, is perfectly unicolor, only some of the upper scales having darker centers. After careful consideration we have decided that *H. macrostomum*, Günther, and *H. fremebundum*, Goode & Bean, must be identical, although there are one or two slight discrepancies in Günther's description.

Hæmulon macrostoma, GÜNTHER, Cat., I, 308, 1859, Jamaica (Coll. Dr. Parnell); JORDAN & SWAIN, *l. c.*, 289; JORDAN & FESLER, *l. c.*, 470.

Hæmulon fremebundum, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 340, Clearwater Harbor, Florida (Type, No. 23628, U.S.N.M. Coll. Dr. J. W. Velie); JORDAN & SWAIN, *l. c.*, 297.

Diabasis fremebundus, JORDAN & GILBERT, Synopsis, 553.

1665. HÆMULON BONARIENSE, Cuvier & Valenciennes.

(BLACK GRUNT; RONCO PRIETO.)

Head $2\frac{4}{5}$; depth $2\frac{2}{3}$; scales 5-44-10. D. XII, 16; A. III, 8. Body oblong, compressed, the back considerably elevated; head rather long; the snout pointed, rather longer and sharper than in *H. parra*, the anterior profile straight, or a very little concave before the eyes. Snout $2\frac{2}{3}$ in head (in young of 9 inches). Mouth rather small, smaller than in *H. parra*, the maxillary barely reaching front of eye, its length 3 in head. Teeth of moderate size, the outer and posterior somewhat enlarged. Eye moderate, $4\frac{2}{3}$ in head; interorbital space flattish, its width $4\frac{1}{4}$ in head; preorbital moderate, its least width $4\frac{4}{5}$ in head; preopercle moderately serrate. Gill rakers few and small, about 12 on lower part of arch. Scales larger than in *H. parra* or any other of the species; those above and below lateral line about equal in size; those above arranged in series which are less oblique and more undulating than in related species, the series from the scapular scale following the direction of the lateral line for about 10 scales, then turning abruptly reaching the base of the last dorsal spine, or sometimes the anterior part of soft dorsal; soft fins scaly, as usual. Dorsal spines of moderate strength, the fourth $2\frac{3}{5}$ in head; longest ray of soft dorsal 4 in head; caudal $1\frac{2}{3}$ in head; anal high, the second spine and the longest rays extending, when depressed, well beyond tip of last ray; longest soft ray $2\frac{3}{4}$ in head; second spine longer and stronger than third, $2\frac{2}{3}$ in head; pectorals long, $1\frac{1}{3}$ in head; ventrals $1\frac{3}{4}$. Color in spirits, pearly gray; center of each scale brownish-black, these coalescing and forming very sharply defined continuous undulating stripes; about 16 of these between front of dorsal and front of anal; the sixth extending from the scapular scale to last dorsal spine; base of caudal blackish; fins dusky. West Indies, south to Buenos Ayres; not very common. (*bonariense*, from Buenos Ayres.)

Hæmulon bonariense, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 254, 1830, Buenos Ayres.

Hæmulon canna, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 233, 1830, Martinique; GÜNTHER, Cat., I, 311, 1859; POEY, Repertorio, I, 309, 1867; not of AGASSIZ, 1829.

Hæmulon notatum, POEY, Memorias, II, 179, 1868, Cuba; POEY, Synopsis, 317; POEY, Enumeratio, 46.

Hæmulon retrocurrens, POEY, Repertorio, II, 236, 461, 1868, Cuba.

Hæmulon continuum, POEY, Enumeratio, 46, 1875, Cuba.

Hæmulon parræ, JORDAN & SWAIN, *l. c.*, 292, 1884.

1666. HÆMULON PARRA (Desmarest).

(SAILOR'S CHOICE; RONCO BLANCO; RONCO PRIETO; BASTARD MARGARET.)

Head 3; depth $2\frac{2}{3}$; eye large, 4 in head. D. XII, 17; A. III, 7; scales 5-50-14. Body comparatively deep, the back compressed and arched; anterior profile rather steep and convex, steep and nearly straight from tip of snout to opposite front of eye; here an obtuse angle is formed, and to the base of dorsal there is a rather even curve. In other specimens there is little or no prominence before eye. Snout comparatively high and obtuse, its length in specimens of moderate size 3 in head; snout shorter in young specimens than in the adult, the maxillary in the young extending farther back although proportionately shorter; mouth rather small for the genus, the maxillary usually extending a little beyond vertical from front of eye, in young nearly to middle of eye, its length $2\frac{3}{7}$ in head; maxillary in adult barely reaching front of eye; jaws subequal, the lower slightly included. Teeth rather strong, in moderate bands, the outer large, the antrorse teeth of the posterior part of lower jaw well developed. Interorbital space convex, its width $4\frac{1}{3}$ in head; preorbital rather deep, its least breadth $5\frac{2}{3}$ in head; preopercle finely, but sharply serrate, the teeth near the angle farther apart than the others but scarcely larger. In regard to the serration of the preopercle we find much variation among our specimens, some of those from Cuba, corresponding more or less perfectly to *H. serratum*, Poey, have the preopercle always strongly serrate, while others, certainly corresponding to *H. acutum*, Poey, have the serrations very inconspicuous. The Key West specimens are in this respect mostly intermediate, and none of them show any other distinctive character correlated with the differences in the preopercle. Gill rakers small, about 15 on lower part of arch. Scales rather large, those above lateral line not especially enlarged, arranged in very oblique series; those below more nearly horizontal; soft fins well scaled; series of scales from scapular scale reaching fourth to sixth dorsal spine. Dorsal spines stout, the fourth highest, $2\frac{1}{5}$ in head; longest soft rays $3\frac{3}{4}$ in head; upper caudal lobe rather longer, $1\frac{2}{5}$ in head; longest anal rays $2\frac{1}{3}$ in head, reaching when depressed beyond the tips of the last rays; second anal spine stronger and longer than third, $2\frac{2}{5}$ in head, reaching when depressed nearly to the tip of the last ray; ventrals $1\frac{5}{6}$ in head; pectorals short, $1\frac{4}{7}$. Color in life, dull pearly-grayish; belly plain grayish, each scale on body above with a conspicuous spot of dull olive-brown, these forming interrupted, oblique, and wavy streaks; head not spotted; mouth not much red, usually faintly orange near the angle in young specimens, a black spot on opercle under angle of preopercle; iris gilt; fins all dull, blackish-gray, the ventrals more or less tipped with blackish. Younger specimens have dark lateral stripes arranged precisely as in *H. macrostomum* and *H. rimator*, and also a dark blotch at base of caudal. In the very young the spots on the scales are indistinct. Cuban specimens are mostly more dusky in color, the vertical fins mostly black, and the spots on the scales larger and almost black. In some these spots coalesce into stripes, but more usually they remain distinct. Other Cuban specimens (*albidum*) are very pale, the dark spots light brown, and specimens of every intermediate shade are in the collection. There are never any shades of blue or yellow on body or fins. Here described from Key West specimens $10\frac{1}{2}$ inches in length. West Indies; southern Florida to Brazil; very common at Key West and Havana. (Named for Don Antonio Parra, who first wrote, in 1780, on the natural history of Cuba.)

Diabasis parra, DESMAREST, Prem. Décade Ichth., 30, pl. 2, fig. 2, 1823, Havana.

Hæmulon caudimacula, CUVIER, Règne Animal, Ed. 2, II, 176, 1829, Brazil; Havana; on *Uribaco*, MARCGRAVE, and *Diabase de Parra*, DESMAREST; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 226, 1830; GÜNTHER, Cat., I, 313; POEY, Repertorio, I. 310, 1867; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 322 (redescription of original type).

Hæmulon chromis, BROUSSONET, MS., in CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 242, 1830, Jamaica; GÜNTHER, Cat., I, 310.

Hæmulon acutum, POEY, Memorias, II, 180, 1860, Cuba; JORDAN & SWAIN, *l. c.*, 294.

Hæmulon serratum, POEY, Memorias, II, 181, 1860, Cuba.

Hæmulon albidum, POEY, Memorias, II, 181, 1860, Cuba.

Hæmulon canna, AGASSIZ, Spix, Pisc. Brasil., 130, pl. 69, 1829; not of CUVIER & VALENCIENNES.

Diabasis chromis, JORDAN & GILBERT, Synopsis, 924.

Hæmulon parra, JORDAN & FESLER, *l. c.*, 471.

1667. HÆMULON SCUDDERI,* Gill.

(MOJARRA PRIETA.)

Head 3⅓; depth 2½. D. XI, 16 (sometimes XII, 15); A. III, 7; scales 5½–49–13; eye large, 4 in head. Body short and deep, deeper than in *H. parra*, the back compressed and arched; anterior profile very steep and nearly straight from the tip of the snout to the nape, then evenly convex; snout low and short but not obtuse, its length in specimens of moderate size, 3 in head; mouth comparatively small, the maxillary extending in adult barely to front of pupil, its length 2½ in head; lower jaw slightly included. Teeth moderate, the posterior teeth of lower jaw largest. Interorbital space convex, its width 3⅔ in head; preorbital rather deep, its least breadth 5 in head; preopercle rather strongly serrate; the teeth near the angle larger and farther apart than the others. Gill rakers rather small, about 7+12. Scales rather large; those above lateral line somewhat enlarged, notably larger than those below, and arranged in very oblique series; series of scales from scapular scale reaching fifth dorsal spine; soft fins well scaled. Dorsal spines stout, the fourth highest, 2 in head; longest soft rays 3⅓ in head; upper caudal lobe 1⅖; longest anal rays 2½ in head, reaching, when depressed, beyond the tip of the last rays, the free margin of the fin straight; second anal spine longer and stronger than third, 2⅒ in head, reaching, when depressed, nearly to the tip of the last ray; ventrals 1½ in head; pectorals long, 1⅒ in head. Coloration precisely as in *Hæmulon parra* and undergoing the same changes with age. Adult, in spirits, dull pearly grayish, light or dark, with a roundish dusky blotch at base of each scale of back and sides, these not coalescent, but forming dark interrupted lines in the direction of the rows of scales; head unspotted, a black blotch under angle of preopercle; fins dusky grayish, the pectorals palest. In life, adult with the back bright yellow-olive to opposite front of dorsal, the posterior half of body more or less

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*This species is the Pacific representative of *Hæmulon parra*. It reaches a similar size, is equally abundant, and passes through a similar range of variations and coloration. The majority of the specimens known from Mazatlan and Panama have 11 dorsal spines and correspond to *Hæmulon undecimale* of Steindachner. Still others of them have, however, 12 dorsal spines, as in the original types of *H. scuddëri* and *H. brevirostrum*. We are unable to detect any other difference of importance among these specimens, and refer all to *H. scudderi*, regarding it as a species with the number of spines indifferently 11 or 12. No other species of *Hæmulon* ever has fewer spines than 12.

abruptly steel-blue black; vertical fins all blackish; in some the whole body is greenish, in others only the anterior half; lower parts all gray; most of these large ones show no traces of spots on scales; some show a few spots; fins silvery, with gold above and below; mouth red within. There is very great variation among individuals as in *Hæmulon parra*, some having small, sharply defined spots, some large spots, and others of the same size none at all. Length 1 foot or less. Pacific coast of tropical America, Guaymas to Panama; everywhere common, especially about rocks. Here described from No. 29282, U.S.N.M., from Panama. (Named for Samuel H. Scudder, the well-known entomologist, who made a very careful study of these fishes while a student under Professor Agassiz.)

Hæmulon scudderi, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 253, Cape San Lucas (Coll Xantus); STEINDACHNER, Ichth. Beitr., III, 18, 1875.
Hæmulon brevirostrum, GÜNTHER, Fishes Centr. Amer., 418, 1869, Panama.
Hæmulon undecimale, STEINDACHNER, Ichth. Beitr., III, 11, 1875, Acapulco; Panama.
Diabasis scudderi, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 361, 626.
Hæmulon scudderi, JORDAN & SWAIN, *l. c.*, 296; JORDAN & FESLER, *l. c.*, 472.

1668. HÆMULON CARBONARIUM, Poey.

(RONCO CARBONERO.)

Head 3; depth $2\frac{4}{5}$; eye large, $3\frac{2}{3}$ in head. D. XII, 16; A. III, 8; scales 7–55–14. Body oblong; the back not greatly elevated, the profile nearly straight or slightly convex from tip of snout to above eye, thence gibbous to front of dorsal; snout short, moderately pointed, its length $3\frac{1}{6}$ in head; mouth not very large; the gape somewhat curved; the maxillary extending nearly or quite to front of pupil, its length $2\frac{1}{2}$ in head; lower jaw rather included. Teeth strong, much as in *H. sciurus*, but a little shorter. Interorbital space flattish, 4 in head; preorbital moderate, its least breadth 6 in head; preorbital finely but rather sharply serrate; gill rakers small, 9+14. Scales moderate, those below lateral line anteriorly moderately enlarged, their series nearly horizontal; series above lateral line very oblique. Dorsal spines slender and high, the fourth $1\frac{7}{8}$ in head; longest soft rays $3\frac{1}{2}$; upper caudal lobe a little longer than lower, $1\frac{1}{5}$ in head; longest anal rays $2\frac{1}{5}$ in head, their tips when depressed reaching beyond tip of last ray; second anal spine strong, 2 in head, its tip reaching when depressed about to tip of last soft ray; ventrals $1\frac{1}{2}$ in head; pectorals $1\frac{2}{7}$. Color in life, light bluish-gray, much as in *H. plumieri;* body with 7 or 8 deep brassy-yellow stripes which are horizontal above, those below the lateral line a little curved, following the rows of scales; stripes narrower than interspaces of ground color; 3 stripes above lateral line, 3 or 4 below, the latter paler; little black under angle of preopercle; caudal blackish-yellowish at tip; soft dorsal, anal, and ventrals yellowish-gray, the distal portion blackish; spinous dorsal bluish, deep yellow at base and edge; a yellowish stripe along middle of fin; pectoral plain, a yellowish bar across its base; mouth deep red, its angle dusky. In spirits, grayish, more or less shaded with dusky, the stripes rather faint orange-brown. A few specimens of this species that we have examined have the ground color much paler, the yellow stripes lighter, and the fins all bright yellow without dusky shades. They probably represent a variation due to the character of the bottom, and are apparently analogous to the form of *H. sciurus*, which has been called *H. multilineatum*. Length about 10 inches. Here described from Havana specimens, 9 inches in length. West Indies and the Bermudas, south to Brazil; very common at Havana. (*carbonarius*, coaly, in allusion to the common name.)

Hæmulon carbonarium, POEY, Memorias, II, 176, 1860, Cuba; POEY, Synopsis, 318, 1868; JORDAN & SWAIN, *l. c.*, 298; JORDAN & FESLER, *l. c.*, 472.

1669. HÆMULON STEINDACHNERI (Jordan & Gilbert).

(RONCADOR RAIADO.)

Head 3; depth $2\frac{3}{5}$. D. XII, 16; A. III, 8; scales 7–50–14 Body oblong, moderately compressed, the back somewhat elevated; the profile from the snout to the base of the dorsal rather steep and straight, or slightly convex; snout pointed, of moderate length, a little more than $\frac{1}{3}$ length of head; ventral outline little curved; caudal peduncle nearly twice as long as deep, $\frac{3}{5}$ length of head; head rather long and pointed; mouth large, little oblique, the premaxillary below lower border of eye; the lower jaw included; the maxillary 2 in head, reaching to opposite middle of pupil, its posterior portion extending behind the preorbital sheath. Teeth strong, in moderate bands, the outer series enlarged, especially in the upper jaw and on the sides of the lower jaw. Chin with a large pit and 2 pores. Eye rather large, 4 in head, shorter than snout, which is more than width of the flattish interorbital space, about $\frac{1}{2}$ wider than the moderate preorbital; preopercle sharply serrate, its upright limb nearly straight. Gill rakers short and weak, about 15 on lower part of arch. Scales moderate, those above lateral line in very oblique series, becoming horizontal on the caudal peduncle, those below it in horizontal series; vertical fins well-scaled, the scaly sheaths of dorsal and anal well developed; scales on breast small. Dorsal fin rather high, the spines strong, the fourth or longest $2\frac{1}{4}$ in head, about $\frac{1}{3}$ longer than the soft rays; caudal short, moderately forked, the upper lobe slightly the longer, $\frac{2}{3}$ head; second anal spine strong, $2\frac{2}{5}$ in head; much longer than the third spine, which is shorter than the soft rays; soft rays of anal high, the first soft ray when depressed reaching almost to tip of last ray much beyond the base of the last ray; ventral fins $\frac{4}{7}$ length of head, not reaching tips of pectorals, which are about $\frac{3}{4}$ length of head. Color in life, olive or golden-brown, golden below, the edges of the scales of back with brilliant bluish luster; each scale on back and sides with a median pearly-bluish spot (much larger than the spots in *Lythrulon flaviguttatum*), these forming very distinct streaks, having the direction of the rows of scales; head brownish, unspotted; a large, distinct, round blackish blotch on end of caudal peduncle and base of caudal fin, more distinct than in other species known to us; a distinct bluish-black vertical bar on lower anterior part of opercle, partly concealed by angle of preopercle; fins all bright golden-yellow; ventrals and anal not dark; peritoneum dusky. Here described from No. 29387, U. S. N. M. Both coasts of tropical America; Guaymas to Panama; St. Lucia to Rio Janeiro; especially abundant about Mazatlan. A species of small size, generally common on the Pacific coast of tropical America and on the southeast coast of Brazil, and a specimen before us was taken by the *Albatross* at St. Lucia. We have examined numerous specimens from Brazil in the Museum of Comparative Zoology (from Rio Janeiro, Rio Grande do Sul, Para, and Maranhaõ) and others from Acapulco. On comparing these with Pacific coast examples we find no difference. This is probably not the original of the poorly figured *H. schranki* of Agassiz, which on the whole seems most likely to have been a faded example of *H. melanurum*. (Named for Dr. Franz Steindachner, director of the museum at Vienna, one of the most accurate and sagacious of ichthyologists.)

Diabasis steindachneri, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881 (1882), 322, Panama and Mazatlan (Types Nos. 29305 and 29387 (Panama), and 28172, etc. (Mazatlan). Coll. Gilbert.)

Hæmulon caudimacula, STEINDACHNER, Ichth. Beiträge, III, 15, 1875; not of CUVIER & VALENCIENNES.

Hæmulon steindachneri, JORDAN & SWAIN, *l. c.*, 299, 1884.

Hæmulon schranki, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 153; JORDAN & FESLER, *l. c.*, 473, 1893; not of AGASSIZ.

1670. HÆMULON MELANURUM (Linnæus).

(JENÍGUANA.)

Head 3; depth 3. D. XII, 16; A. III, 8; scales 7–50–15. Eye moderate, 5 in head; interorbital width 4; preorbital low, its least breadth 7 in head. Gill rakers small, 8 + 13. Body comparatively elongate, the back not much elevated, the profile slightly convex from tip of snout to front of eye, thence more convex to front of dorsal; snout of moderate length, rather pointed, 2¾ in head; mouth rather large, the gape a little curved, the maxillary reaching past front of pupil, its length 2 in head; teeth moderate, those in front somewhat enlarged; antrorse teeth of posterior part of jaws not very large. Scales moderate, those above lateral line not enlarged, their arrangement about as in *H. sciurus*. Dorsal spines rather slender, the fourth 2⅕ in head; upper caudal lobe the longer, 1⅓ in head; longest anal rays 3 in head, their tips, when depressed, not extending beyond last ray; second anal spine 2¼ to 2¾ in head, reaching, when depressed, rather beyond middle of last ray; ventrals 1¾ in head; pectorals 1½, not reaching past ventrals. Color in life, pearly gray; back and sides with about 10 horizontal stripes of golden yellow, narrower than the interspaces of the ground color; snout above bluish-dusky; a dusky stripe through eye from tip of snout to behind gill opening; a well-defined black area on back and caudal fin, bounded below by an almost straight line from first dorsal spine to tip of lower caudal lobe; middle part of both caudal lobes black, the edges gray; a black spot under angle of preopercle; mouth within very red; pectorals, ventrals, and anal gray, not yellow; soft dorsal dusky along the base. West Indies; rather common at Havana and southward. It reaches a length of about a foot. Here described from Havana specimens. Others examined from St. Thomas, Nassau, and Sombrero Key. (*μέλας*, black; *οὐρά*, tail.)

Perca marina cauda nigra (Black tail), Catesby, Hist. Car., pl. 7, fig. 2, 1743, Bahamas.

Perca melanura, Linnæus, Syst. Nat., x, 292, 1758; xii, 486, 1766, Bahamas; based on Catesby.

Hæmulon schranki, Agassiz, Spix, Pisc. Brasil., 121, pl. 69, 1829, Brazil.

Hæmulon dorsale, Poey, Memorias, ii, 179, 1860, Cuba.

Hæmulon melanurum, Cope, Trans. Am. Phil. Soc. 1871, 471; Jordan & Swain, . c., 300, 1884; Jordan & Fesler, *l. c.*, 473.

1671. HÆMULON SCIURUS (Shaw).

(Yellow Grunt; Ronco Amarillo; Boar Grunt.)

Head $2\frac{3}{4}$; depth $2\frac{3}{5}$. D. XII, 16; A. III, 8; scales 7–53–14. Eye moderate, 4 in head; interorbital space convex, $3\frac{5}{6}$ in head; preorbital moderate, its least breadth $6\frac{2}{3}$ in head; preopercle finely serrate; gill rakers small, about 13+17. Body oblong; the back not specially elevated; the profile nearly straight or slightly concave from tip of snout to before eye, thence a little gibbous to base of dorsal; snout moderately acute, $2\frac{1}{2}$ in head. Mouth large, the gape curved, the maxillary reaching a little past front of pupil, its length 2 in head; lower jaw slightly included; teeth strong; upper jaw in front with about 3 strong canines on each side, these stronger than any of the other teeth; front teeth of lower jaw rather strong, as also the antrorse teeth of the back part of both jaws. Scales moderate, those above lateral line not at all enlarged, arranged in oblique series, those below in nearly horizontal ones. Dorsal spines rather slender, the fourth longest, $2\frac{2}{5}$ in head; longest soft rays 4; upper caudal lobe longer than lower, $1\frac{1}{8}$ in head; longest anal rays $2\frac{1}{4}$ in head, their tips, when depressed, extending beyond the tips of the last rays; second anal spine stronger and longer than third, $2\frac{1}{8}$ in head, its tip, when depressed, reaching past the middle of the last ray; ventrals $1\frac{2}{3}$ in head; pectorals $1\frac{2}{5}$. Color in life, deep brassy yellow, scarcely paler below or darker above; head and body with about 12 conspicuous slightly wavy, longitudinal stripes of sky-blue, deepest on the snout, each with a very narrow edge of dusky olive; these stripes on the head curving upward below eye, the first stripe below eye forking near the posterior margin of preopercle and inclosing an oblong area of the ground color; iris gilt, a dark spot under the angle of preopercle; spinous dorsal edged and shaded with yellowish, its membrane mostly bluish; soft dorsal yellowish; caudal yellowish, broadly dusky at base, the degree of this duskiness being variable; mouth deep orange within; pectorals pale yellowish; anal and ventrals deeper yellowish; the young have more yellow on fins and less on body, with traces of a dark caudal spot. The coloration becomes fainter in spirits, the blue lines becoming gray. Here described from examples from Key West, 10 inches in length. Specimens from Cuba are slightly darker, but not otherwise different. Among them are 2 which evidently correspond to *H. multilineatum* of Poey. These, in life, showed the following coloration: Clear bright yellow, with brassy tinge, the stripes clear sky-blue, without darker edge; iris yellow, no black at base of caudal;

mouth deep red, no black under angle of preopercle; fins yellow; pectorals and ventrals little yellow. Color in life notably different from that of *H. sciurus*, but the difference consists really in the absence of dusky shading and disappears entirely in spirits, these specimens being now scarcely distinguishable from the ordinary *H. sciurus*. West Indies; Florida Keys to Brazil; everywhere common in the West Indies; a handsome species, reaching a length of 18 inches. (*sciurus*, squirrel, from the grunting noise of *Diplectrum formosum*, with which species it was early confounded).

Anthias formosus, BLOCH, Ichthyol., pl. 323, 1790, Antilles; not *Perca formosa*, LINNÆUS, with which it is identified; the latter is *Diplectrum formosum*.

Sparus sciurus, SHAW, General Zoology, IV, pl. 64, 1803, Antilles; based on the description and figure of BLOCH.

Hæmulon elegans, CUVIER, Règne Animal, Ed. 2, II, 175, 1829; no description; based on the figure by BLOCH; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 227, 1830; GÜNTHER, Cat., I, 306.

?*Diabasis obliquatus*,[*] BENNETT, Zoological Journal London, V, 1835, 90, Jamaica. Blue stripes on body said to be oblique, the description not corresponding fully to this or any other known species.

? *Hæmulon similis*, CASTELNAU, Anim. Nom. Rares, II, 1855, Bahia; description very imperfect.

Hæmulon luteum, POEY, Memorias, II, 174, 1860, Cuba.

Hæmulon multilineatum, POEY, Memorias, II, 178, 1860, Cuba.

Hæmulon hians, HALY, Ann. Nat. Hist., XV, 1875, 268, specimen from Aspinwall.

Diabasis elegans, JORDAN & GILBERT, Synopsis, 923.

Hæmulon sciurus, JORDAN, Proc. U. S. Nat. Mus 1884, 126; JORDAN & SWAIN, *l. c.*, 301.

Hæmulon sciurus, JORDAN & FESLER, *l. c.*, 474, 1893.

1672. HÆMULON PLUMIERI (Lacépède).

(COMMON GRUNT; RONCO RONCO; RONCO ARARÁ.)

Head $2\frac{2}{3}$; depth $2\frac{2}{3}$; eye small, 5 to 6 in head. D. XII, 16; A. III, 8; scales 5-50-17. Body moderately elongate, the back elevated and somewhat compressed; head long, the snout sharp and projecting, its length $2\frac{1}{5}$ in head; anterior profile more or less S-shaped, nearly straight from tip of snout to before eye, there concave, and thence gibbous to the front of dorsal, old specimens having the nape more gibbous than young ones.

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[*] The following is Bennett's description of—

"*Diabasis obliquatus.—Diabasis flavescens*, capite vittis cœruleis duodecim, corpore lineis cœruleis obliquis numerosis. Dorsal $\frac{12}{16}$; pectoral 16; ventral $\frac{1}{6}$; anal $\frac{3}{12}$; caudal 16. On a yellowish, somewhat fuscous, ground (perhaps altered by the spirit, in which the specimen has been immersed for about three months); the markings are pale blue, in numerous vittæ; those on the head and opercula, which are somewhat broader and more deeply coloured than those of the body, are nearly longitudinal, about twelve in number; those of the body are oblique, directed upward and backward. The latter are formed by lines passing across the middle of each scale, and are consequently numerous, not less than sixteen or seventeen being crossed by a line drawn from the junction of the spinous and soft portions of the dorsal fin to the belly in front of the anus. On the tail, behind the dorsal and anal fins, the markings become longitudinal, in about nine rows. The fins, especially their scaly, soft portions, are more fuscous than the body; into these the markings do not extend. The lateral line, deflected opposite to the extremity of the dorsal fin, is yellow, and is accompanied below by a blue line; a similar line, but more distinct, passes along its upper edge. The caudal fin is forked; the spines of the dorsal are filamentous. The front and extreme teeth in each jaw, especially in the upper, are longer and stronger than the others, and are somewhat hooked, a variance from the generic mark 'dents en velours' indicated by M. Cuvier."

Mouth very large, the gape curved; maxillary reaching to a little beyond front of eye, its length 1⅞ in head; lower jaw slightly included. Teeth strong, in rather broad bands, those of the outer series enlarged; antrorse teeth of posterior part of both jaws strong. Interorbital space convex, 4 in head; preorbital rather deep, its least breadth 6 in head; preopercle finely serrate. Gill rakers small, about 12+15. Scales rather large, those above lateral line anteriorly very much enlarged, arranged in irregular and very oblique series, those below also oblique.

Dorsal spines stout, the fourth longest, 2⅖ in head; longest soft rays 3¾ in head; caudal lobes subequal, 2 in head; longest anal rays 2⅘ in head, their tips, when depressed, about reaching tips of the last rays; second anal spine longer and stronger than third, 2½ in head, its tip, when depressed, at least reaching middle of last ray; ventrals 1¾ in head; pectorals 1½. Color in life bluish-gray, the base of the scales above bright bronze, tinged with olive; bases of scales below lateral line also bronze, this color forming very oblique stripes, running upward and backward; anterior region above lateral line with 3 or 4 sky-blue stripes, ill-defined, apparently continuations of stripes of head; head golden-bronze, with many narrow stripes of deep clear blue, as if painted on, these nearly horizontal, except before eye, where a few curved ones cross the forehead; also these lines curve slightly upward below eye. Lips dusky; inside of mouth deep orange, bordered anteriorly on the jaws by yellow; a greenish bar on opercle partly concealed by the preopercle; dorsal grayish, with a narrow yellow edge on spinous portion; caudal plain gray; anal gray, tinged with yellow; ventrals gray, with a clear blue luster which disappears after death; pectorals gray, a dusky bar at base. There is considerable variation in the depth of color in this species. The young is similar to the adult in color, but has traces of two lateral bands and a dusky caudal spot. The color in spirits differs only in the blue becoming dusky. West Indies; abundant from Cape Hatteras to Rio Janeiro on sandy shores; here described from Key West specimens. This species is the "Grunt" par excellence of our South Atlantic coast. It is not rare in West Florida and on the Carolina coast, while at Key West it is the most abundant food-fish, the amount taken during the year exceeding that of all other shore species combined. At Havana it is proportionally much less common, though still the most abundant of its genus. It does not usually exceed a foot in length, although individuals 18 inches long are sometimes taken. These large grunts have the back and nape more elevated, and correspond to Cuvier's *Hæmulon arcuatum*. (Named for Father Plumier, an early naturalist who sent drawings of the fishes of Martinique to the museums of Europe.)

Guabi coara brasiliensibus, MARCGRAVE, Hist. Brasil., 163, 1648, Brazil.

Perca marina capite striato (the Grunt), CATESBY, Hist. Carolina, pl. 6, 1743, Bahamas, etc.

Labrus plumieri, LACÉPÈDE, Hist. Nat. Poiss., III, 480, pl. 2, fig. 2, 1802, Martinique; on a copy of a drawing by PLUMIER.

Hæmulon formosum, CUVIER, Règne Animal, Ed. 2, II, 175, 1829, Martinique; GÜNTHER, Cat., I, 305, 1859; not *Perca formosa* of LINNÆUS.

Hæmulon arcuatum, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IX, 481, 1833, Charleston, South Carolina.

Hæmulon arara, POEY, Memorias, II, 177, 1860, Cuba.

Hæmulon subarcuatum, POEY, Memorias, II, 419, 1860, Cuba; a specimen with blue bands on anterior half of head only.

Diabasis plumieri, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 603; JORDAN & GILBERT, Synopsis, 971.

Hæmulon plumieri, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 126; JORDAN & SWAIN, *l. c.*, 303; JORDAN & FESLER, *l. c.*, 475.

1673. HÆMULON FLAVOLINEATUM (Desmarest).

(FRENCH GRUNT; OPEN-MOUTHED GRUNT; RONCO CONDENADO.)

Head 3; depth 2¾. D. XII, 14; A. III, 8; scales 6–50–11. Eye large, 3½ in head; interorbital width 3½; preorbital low, its least width 7½ in head. Preopercle rather evenly and sharply serrate; gill rakers very small, about 8 + 13. Body oblong-ovate, comparatively deep and compressed; back somewhat elevated; anterior profile nearly straight from the tip of the snout to the nape, thence gently convex; snout rather short, acute, its length 3 in head. Mouth not very large, the gape curved; maxillary reaching about to opposite front of the pupil, its length 2⅓ in head. Teeth of moderate size, the outer enlarged; antrorse teeth in the posterior part of each jaw considerably enlarged; those of the upper jaw caninelike, larger than any of the other teeth. Scales large; those of the anterior and middle parts of the body, down to the level of the lower part of pectoral, much enlarged, having nearly double the depth of the scales above lateral line; rows above lateral line running very obliquely upward and backward; those below somewhat wavy, most of them forming a curve with the convexity downward and backward. Dorsal spines moderate, the fourth 2 in head; upper caudal lobe 1⅖; longest anal rays 2⅕ in head, their tips extending, when depressed, beyond the tip of the last ray; second anal spine much longer and stronger than third, 2 in head, its tip, when depressed, reaching nearly to tip of last ray; ventrals 1⅗ in head; pectorals narrow and long reaching to vent, 1⅓. Color in life, light bluish-gray as ground color. A bronze-yellow spot on the upper part of each scale, these forming continuous undulating stripes on the whole body and head, wider than the interspaces of the ground color; on caudal peduncle they are nearly straight; on anterior part of the body below lateral line they are broader and very oblique. A horizontal stripe, crossing the others, runs along the side of back from occiput to last rays of soft dorsal, of the same golden-yellow; yellow around eye; yellow shades and streaks on cheeks, not strongly marked as in *H. sciurus* and *H. plumieri;* yellow stripes on top of head; angle of mouth black, inside brick-red; a large black blotch under angle of preopercle; fins bright golden-yellow, the pectoral and spinous dorsal paler. In spirits the ground color becomes grayish and the stripes brownish or dusky. Length a foot. West Indies; Florida Keys and Bermudas to Brazil; rare in Florida, common in the West Indies; one of the most strongly marked species. Here described from Havana specimens. (*flavus*, yellow; *lineatus*, marked with lines.)

Diabasis flavolineatus, DESMAREST, Prem. Décade Ichth., 35, pl. 2, fig. 1, 1823, Cuba.

Hæmulon heterodon, CUVIER, Règne Animal, Ed. 2, II, 176, 1829, Cuba; based on *Diabase rayée* of DESMAREST; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 255, 1830.

Hæmulon xanthopteron, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 254, 1830, Martinique.
Hæmulon xanthopterum, GÜNTHER, Cat., I, 312, 1859.
Hæmulon flavolineatum, POEY, Repertorio, I, 309, 1867; JORDAN & FESLER, *l. c.*, 476; JORDAN & SWAIN, *l. c.*, 305.

538. BRACHYGENYS, Scudder.

Brachygenys (SCUDDER MS.) POEY, Synopsis Piscium Cubensium, 310, 1868 (*tæniatum*).

This genus differs from *Hæmulon* in the small mouth and slender body, the cleft of the mouth being less than $\frac{1}{4}$ head, the snout very short, the frontal foramina separate, placed some distance before the very short supraoccipital crest. Jaws red within. One species known. (*βραχύς*, short; *γένυς*, chin.)

1674. BRACHYGENYS CHRYSARGYREUS (Günther).

Head $3\frac{1}{5}$; depth $3\frac{1}{5}$ to $3\frac{2}{7}$; eye very large, 3. D. XII, 14; A. III, 9; scales 7–52–13. Body more elongate than in any of the other species, except *B. aurolineatum*, moderately compressed, the back little elevated, the profile forming a weak but nearly regular curve from in front of eyes to dorsal; before the eyes is a slight angle and the profile of the snout is rather more steep; snout very short and obtuse, its length $3\frac{2}{3}$ in head; mouth very small for the genus, smaller than in any other species, its gape but little curved; maxillary reaching a little past front of eye, its length $3\frac{1}{4}$ in head; teeth weaker than in any other of our species, the posterior teeth scarcely enlarged; interorbital space broad, convex, its breadth 4 in head; preorbital very low, its least breadth $7\frac{1}{2}$ in head. Preopercle evenly and rather sharply serrate. Gill rakers small, 8 + 15. Scales small, very regularly arranged, those above lateral line in very oblique series, those below in horizontal series. Dorsal spines slender and high, the fourth $1\frac{3}{4}$ in head; upper caudal lobe 1; posterior of anal concave, longest rays 2 in head, their tips not nearly reaching, when depressed, to the tips of the last rays; second anal spine short and weak, $2\frac{3}{4}$ in head, not longer than third, and but little stronger, its tip, when depressed, reaching to base of the median soft rays and not to the tip of the third spine; ventrals $1\frac{3}{5}$ in head; pectorals $1\frac{2}{5}$; frontal foramina separate, some distance before the very low supraoccipital crest. Color in life, bluish above, white below, sides with 5 stripes of clear bronze-orange, 4 most distinct, all of equal width, about half pupil; a median stripe from middle of interorbital space to dorsal; the next pair from tip of snout above to last rays of dorsal, becoming median on caudal peduncle; 1 from nostril above eye to below last rays of soft dorsal; 1 through snout and eye, straight to base of caudal; 1 below eye to lower part of caudal; a very faint one from angle of mouth and along lower part of sides; axil slightly dusky; fins all light orange-yellow, unmarked; dorsal and anal with very narrow dusky edge; no trace of dark caudal spot; mouth pale reddish within in young, light orange in adults. In spirits the body and head are bluish-silvery. This little fish, the smallest of the group, is abundant both at Key West and

Havana. None of the specimens seen exceeds 6 inches in length. It differs from the others in the less development of the cavernous structure of the skull, the foramina on the frontal region being inconspicuous. (*χρυσός*, gold; *ἀργύρεος*, silver.)

Hæmulon chrysargyreum, Günther, Cat., i, 314, 1859, Trinidad.
Hæmulon tæniatum, Poey, Memorias, ii, 182, 1860, Cuba; young.
Brachygenys tæniata, Poey, Enumeratio, 47, 1875.
Hæmulon chrysargyreum, Jordan & Fesler, *l. c.*, 476.

539. BATHYSTOMA, Scudder.

(Tom Tates.)

Bathystoma (Scudder MS.) Putnam, Bull. Mus. Comp. Zool., i, 12, 1863 (*jeniguano*, etc.); no definition.

This genus differs from *Hæmulon* in the presence of 13 dorsal spines; body rather elongate; gill rakers rather numerous, 12 to 18 on lower part of anterior arch; mouth moderate; scales small; frontal foramina long, divided slits in front of the supraoccipital crest. Jaws red within. (*βαθύς*, low; *στόμα*, mouth.)

a. Mouth large, the maxillary reaching middle of eye, its length about $\frac{1}{2}$ head; gill rakers rather short and few; scales moderate, 50 to 55 in the lateral line; second anal spine scarcely larger or longer than third, $2\frac{3}{4}$ or more in head.
  b. Body oblong, the back moderately elevated, the depth $2\frac{3}{4}$ to 3 in length. RIMATOR, 1675.
  bb. Body subfusiform, the back little elevated, the depth $3\frac{1}{8}$ to $3\frac{1}{2}$ in length. AUROLINEATUM, 1676.
aa. Mouth rather small, the maxillary not reaching to opposite middle of eye, its length not quite $\frac{1}{2}$ head; gill rakers numerous, rather long; scales small, about 70 in lateral line; second anal spine notably longer and larger than third; body more elongate than in other species, depth about $3\frac{1}{2}$ in length. STRIATUM, 1677.

1675. BATHYSTOMA RIMATOR (Jordan & Swain).

(Tom Tate; Red-mouth Grunt; Cæsar.)

Head $2\frac{5}{7}$; depth $2\frac{5}{6}$; eye rather large, $4\frac{1}{4}$ in head; interorbital space convex, $3\frac{3}{4}$ in head; preorbital low, its least breadth 8 in head. Gill rakers small, about 11+16. D. XIII, 15; A. III, 8; scales 8–51–13. Body rather elongate but not fusiform, the back somewhat elevated, the profile straight or slightly convex from tip of snout to behind eye, where it becomes gradually more convex; snout short, rather pointed, about 3 in head. Mouth large, the maxillary reaching middle of pupil, its length 2 in head. Teeth not very strong, those of the outer series a little enlarged, the antrores posterior teeth rather large. Scales rather small, those above lateral line regularly arranged in oblique series, the series below nearly horizontal. Dorsal spines slender and high, the fourth 2 to $2\frac{1}{3}$ in head; upper caudal lobe $1\frac{1}{2}$ in head; longest anal rays 3 in head, their tips not reaching tips of last rays when depressed; second anal spine but little longer than third, 2⅚ in head, the two more nearly equal than usual in this genus, their tips, when depressed, reaching middle of last ray; ventrals 1¾ in head; pectorals 1½, their tips not reaching past tips of ventrals. Frontal foramina as in other species of the subgenus *Bathystoma*, long divided slits in front of the supraoccipital crest. Color in life, silvery white, slightly bluish above, with iridescent reflections; edges of scales of body light yellow, these forming continuous light yellow lines, those below lateral line horizontal, those above very oblique; besides these, a narrow continuous streak of light yellow above lateral line, from head to end of soft dorsal, and another from eye to middle of caudal; head silvery-yellowish above; inside of mouth red; no black under preopercle; traces of black blotch at base of caudal; fins colorless, the lower slightly yellowish. Young are light olivaceous, grayish-silvery below; a dark bronze band, narrower than pupil, darkest in the younger specimen from snout through eye straight to base of caudal; above this, 2 or 3 dark streaks, the middle one most distinct, from eye to above gill opening; another, beginning on top of snout on each side, passing above eye, and extending parallel with the first-mentioned stripe straight to last ray of dorsal, where it meets its fellow of the opposite side; a dark streak from tip of snout along median line to front of dorsal; a large rounded black blotch at base of caudal, somewhat obscure dusky shading below soft dorsal and at base of pectoral; fins all plain, upper slightly dusky; anal nearly white; pectorals, caudal, and ventrals light yellow; lining of opercle plain orange; inside of mouth scarlet. In the large specimen (5½ inches long) the dark stripes are fainter, paler, and more yellowish; several fainter bands occur between the broader ones, and faint oblique streaks of light bronze follow the rows of scales, those above lateral line oblique. In spirits the adult is plain silvery. West Indies; Cape Hatteras to Trinidad; apparently more abundant on our South Atlantic coast than southward; not seen at Havana. Abundant about Charleston, South Carolina, where it is one of the most abundant food-fishes. About Pensacola and Key West the adult are less numerous, but at the latter place the young swarm everywhere about the wharves and shores. (*rimator*, inquirer, in allusion to the inquisitive habits of the young, which swarm about the wharves, nibbling bait intended for larger fishes.)

Hæmulon rimator, Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 308, Charleston; Key West; Pensacola; Jordan & Fesler, *l. c.*, 477.

Hæmulon chrysopteron, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 240, 1830, brought by Milbert from New York; erroneously identified with *Perca chrysoptera*, Linnæus, which is an *Orthopristis*.

Hæmulon chrysopterum, Günther, Cat., I, 313, 1859.

Hæmulon quadrilineatum, Holbrook, Ichth. S. Car., 195, 1860; not of Cuvier & Valenciennes.

Hæmulon ? caudimacula, Poey, Synopsis, 47, 1875; not of Cuvier & Valenciennes.

Hæmulon parræ, Poey, Enumeratio, 47, 1875; not *Diabasis parra*, Desmarest.

Diabasis aurolineatus, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 276, 307; Jordan & Gilbert, Synopsis, 973; not *Hæmulon aurolineatum*, Cuvier & Valenciennes.

Diabasis chrysopterus, Jordan & Gilbert, Synopsis, 553.

1676. BATHYSTOMA AUROLINEATUM * (Cuvier & Valenciennes).

(JENÍGUANO.)

Head 3; depth $3\frac{2}{7}$; eye large, $3\frac{3}{4}$ in head; interorbital space convex, its width 4 in head; preorbital very low, its least breadth about 7 in head. Gill rakers small, about 12 on lower part of arch. D. XIII, 15; A. III, 8; scales 8–51–13. Body compressed, fusiform, the back not elevated; the profile forming a weak but nearly regular curve from the tip of the snout to the front of the dorsal; snout short, moderately pointed, 3 in head; mouth large, curved, the maxillary reaching to slightly beyond middle of pupil, its length $1\frac{5}{6}$ in head. Teeth not very strong, about as in *B. rimator*. Scales rather small, arranged about as in *B. rimator*. Dorsal spines slender, rather high, the fourth $2\frac{1}{3}$ in head; upper caudal lobe $1\frac{1}{3}$ in head; longest anal rays $2\frac{4}{5}$ in head, their tips not reaching nearly to tips of last rays; second anal spine not very much longer than third, about 3 in head, reaching, when depressed, little past the base of the last ray; ventrals $1\frac{4}{5}$ in head; pectorals $1\frac{1}{2}$, their tips reaching slightly beyond tips of ventrals. Color in life, dusky gray, with 7 or 8 yellow longitudinal streaks, the one through eye widest; mouth very red; no dusky spot under the angle of preopercle; fins gray; dorsal scarcely yellowish. In spirits the vertical fins and snout are somewhat dusky; the paired fins are grayish, the golden stripes faint. Length 6 to 8 inches. Here described from Havana specimens. West Indies; Florida Keys to Brazil; very abundant at Havana, where it is often brought into the market. It is smaller in size than any other of this or related genera except *Brachygenys chrysargyreum*. It has been taken at Garden Key, Fla., but was not observed at Key West. (*aurum*, gold; *lineatus*, striped.)

Hæmulon aurolineatum, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 237, 1830, Brazil; San Domingo; JORDAN & FESLER, *l. c.*, 478.

Hæmulon jeniguano, POEY, Memorias, II, 183, 1860, Cuba; JORDAN & GILBERT, Synopsis, 925.

Hæmulon aurolineatum, GÜNTHER, Cat., I, 318, 1859.

1677. BATHYSTOMA STRIATUM (Linnæus).

(WHITE GRUNT.)

Head $3\frac{1}{2}$; depth $3\frac{1}{2}$; eye large, $3\frac{2}{5}$ in head. D. XIII, 13; A. III, 7; scales 7–70–18. Body elongate, fusiform, more slender than in any other of the species, the back little elevated, not much compressed, the anterior profile gently convex, not steep. Head small, the snout short and not very acute, its length $3\frac{1}{3}$ in head; mouth comparatively small, smaller than in *B. aurolineatum*, the maxillary extending to beyond front of pupil, its length $2\frac{1}{5}$ in head. Teeth rather small, the outer and posterior a little enlarged; lower jaw slightly included. Preorbital narrow, its least breadth 9 in head; interorbital space broad, convex, its width $2\frac{2}{3}$ in head; preopercle moderately serrate. Gill rakers much longer and more numerous than in *B. aurolineatum* and other species, about 18 on lower part of anterior arch, the longest $\frac{3}{4}$ least depth of preorbital. Scales notably smaller than in any other species of the genus, those above lateral line in very oblique series, those below more nearly horizontal, and none of them specially enlarged; soft fins scaly, as usual. Dorsal spines slender, rather low, the fourth or longest $2\frac{1}{10}$ in head; soft dorsal long and low, the longest ray $3\frac{2}{5}$ in head; caudal deeply forked, the upper lobe $1\frac{1}{10}$ in head; anal rather low and small, its longest rays $3\frac{1}{5}$ in head, not reaching, when depressed, to the tip of the last rays; second anal spine notably longer and stronger than third, $2\frac{2}{5}$ in head, reaching, when depressed, a little past base of last ray; ventrals $1\frac{3}{5}$ in head; pectorals $1\frac{2}{5}$. Color in spirits pearly gray, with continuous brown streaks (golden in life), 1 on the median line above from tip of snout to dorsal, 4 on each side of top of head above eye, 3 of these extending on the body, but only the second continuous, this very distinct and reaching last ray of dorsal; below these, 2 extending backward from eye, the uppermost distinct anteriorly, fading behind, the lowest fading anteriorly; below this traces of another dusky stripe; there are thus 3 or 4 distinct longitudinal streaks on body, with 2 or 3 fainter ones; fins pale, probably yellowish in life. This is one of the smaller species, probably never exceeding a foot in length. It is allied to *B. aurolineatum* and *B. rimator*, but deviates from the ordinary *Bathystoma* type more than either of these. Here described from No. 9839, U. S. N. M., sent by Poey from Cuba. West Indies; Bermudas to Brazil; not common. (*striatus*, striped.)

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* We have adopted the name *aurolineatum* for this species, and not for *B. rimator*, on the strength of the following account of the typical specimen of *Bathystoma aurolineatum* received from Dr. H. E. Sauvage, of the museum at Paris.

Hæmulon aurolineatum, Brazil, Delalande, type. Length of the body, 0.220 m.; height of body, 0.055 m.; length of the head, 0.60 m. Height of the body contained nearly 4 times in the total length, and $3\frac{1}{2}$ without the caudal.

As the description of Cuvier & Valenciennes agrees in other respects equally well with either species, the above measurements leave no doubt of the identity of their type with *B. jeniguano*. *Bathystoma rimator*, young or old, is never so slender as the above measurements would indicate.

Capeuna brasiliensibus, MARCGRAVE, Hist. Brasil., 155, 1648, Brazil.

Perca striata, LINNÆUS, Syst. Nat., Ed. X, 233, 1758, North America.

Grammistes trivittatus, BLOCH & SCHNEIDER, Syst. Ichth., 188, 1801, Brazil; on the description of MARCGRAVE.

Serranus capeuna, LICHTENSTEIN, Abhandl. Berlin Akad. 1821, 288, Brazil; on the description of MARCGRAVE.

Hæmulon quadrilineatum, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 238, pl. 120, 1830, San Domingo; GÜNTHER, Cat., I, 316; POEY, Repertorio, I, 310, 1867; II, 161; JORDAN & SWAIN, *l. c.*, 311.

Hæmulon quinquelineatum, POEY, Memorias, II, 419, 1860, Cuba.

Hæmulon capeuna, CUVIER, Règne Animal, Ed. 2, II, 176, 1829; no description; after MARCGRAVE.

Hæmylum capeuna, GOODE, Bull. U. S. Nat. Mus., V, 53, 1876.

Diabasis trivittatus, JORDAN & GILBERT, Synopsis, 554; erroneously ascribed, after HOLBROOK, to the Carolina fauna.

Hæmulon striatum, JORDAN & FESLER, *l. c.*, 479.

540. LYTHRULON, Jordan & Swain.

Lythrulon, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 287 (*flaviguttatum*).

This genus is closely allied to *Hæmulon*, differing in the short snout, high supraoccipital crest, oblique mouth, and increased number of gill rakers. The form of the body is peculiar, the dorsal and anal long and low, and the caudal widely forked. Two species known. (*λύθρον*, gore; *οὖλον*, gum.)

a. Gill rakers about 10 + 22 = 32; body oblong, the depth 3 in length. FLAVIGUTTATUM, 1678.

aa. Gill rakers 8 + 15 = 23; body deep, the depth $2\frac{2}{3}$ in length. OPALESCENS, 1679.

1678. LYTHRULON FLAVIGUTTATUM (Gill).

(PEIXE-FONDA.)

Head $3\frac{1}{4}$; depth 3. D. XII, 15, rarely XIII, 15; A. III, 8; snout 4 in head; maxillary reaching a little past front of pupil, $2\frac{1}{2}$; orbit 3; interorbital $4\frac{1}{2}$; longest dorsal spine $2\frac{1}{5}$; longest dorsal ray $3\frac{4}{5}$; second anal spine 3; pectoral $1\frac{1}{4}$; ventral $1\frac{3}{5}$; scales 6–49–14. Form elongate oval, compressed, the curve of ventral and dorsal outlines about equal and uniform. Head small and short, with short pointed snout; anterior profile very slightly concave before eye, thence slightly convex to dorsal; mouth small and oblique with the lower jaws projecting; teeth all small, the outer scarcely enlarged; preopercle finely and sharply serrate, its posterior edge shallowly concave, its angle broadly rounded. Gill rakers slender and numerous, the longest nearly equal to the diameter of pupil, about 10 + 22. Scales of moderate size, those above lateral line arranged in very oblique series; tip of snout, chin, and maxillary naked; scales on top of head and cheeks small and crowded; soft fins with scales. Pectoral $1\frac{1}{5}$ in head, reaching nearly to vent; ventrals $1\frac{2}{3}$, reaching halfway to anal rays; second anal spine a little longer and stronger than third, its tip when depressed not reaching base of last rays; caudal fin forked, its upper lobe the longer. Frontal foramina 2 short slits close together, just in front of the high supraorbital crest. Color in spirits, dark steel-gray; a small very distinct pale spot on each scale of back and sides, surrounded by darker; this spot in spirits light yellowish; in life of a pearly blue; head plain; a small dusky blotch under angle of preopercle; fins plain, bright yellow in life. Young with a large black blotch at base of caudal, as in *Hæmulon steindachneri* and *Orthostœchus maculicauda*, and without the dusky horizontal streaks seen in most of the other species. Length 1 foot. Here described from a specimen 9 inches long from Guaymas, Mexico. Pacific coast of tropical America, Guaymas to Panama; generally common along the Pacific coast of tropical America. (*flavus*, yellow; *guttatus*, spotted.)

Hæmulon flaviguttatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 254, Cape San Lucas (Coll. Xantus).

Hæmulon margaritiferum, GÜNTHER, Proc. Zool. Soc. London 1864, 147, Panama.

Hæmulon flaviguttatum, STEINDACHNER, Ichth. Beit., III, 14, 1875; JORDAN & SWAIN, *l. c.*, 314; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 152; JORDAN & FESLER, *l. c.*, 479.

1679. LYTHRULON OPALESCENS, Jordan & Starks.

Head $3\frac{1}{2}$; depth $2\frac{2}{3}$. D. XII, 16; A. III, 9; snout $3\frac{2}{3}$ in head; maxillary reaching slightly past front of pupil, $2\frac{1}{2}$ in head; orbit $2\frac{5}{6}$; interorbital $3\frac{2}{3}$; longest dorsal spine 2; longest dorsal ray 4; second anal spine $2\frac{1}{2}$; pectoral $1\frac{1}{16}$; ventrals $1\frac{1}{2}$; scales 7–54–13. Body deep, compressed, the back well elevated, the dorsal outline nearly uniformly curved from tip of snout to caudal peduncle; ventral outline curved from chin to breast, thence straight to anal spine, and slanting obliquely upward to caudal peduncle. Snout small and pointed; mouth small and oblique, the lower jaw slightly projecting; teeth all small, the outer scarcely enlarged; preopercle finely serrate, the posterior limb somewhat concave, the angle broadly rounded. Gill rakers short and slender, about $\frac{1}{2}$ the diameter of pupil, $8+15$; scales above lateral line arranged in oblique series; tip of snout, chin, and maxillary naked; scales on head small and crowded; soft fins scaled. Pectoral reaching to vent; ventrals reaching halfway to second anal ray; second anal spine a little longer and stronger than third; upper lobe of caudal the longer, about equal to head. Color as in *Lythrulon flaviguttatum*, in spirits, dark steel gray; a small very distinct pale spot on each scale of back and sides, surrounded by darker, this spot, in spirits, light yellowish; in life of a pearly blue; head plain; a small dusky blotch under angle of preopercle; fins plain bright yellow in life. Young with a large black blotch at base of caudal, as in *Hæmulon steindachneri* and *Orthostœchus maculicauda*, and without the dusky horizontal streaks seen in most of the other species. This species differs from *L. flaviguttatum* in having fewer gill rakers, the depth and arch of the back greater. Rather common in the estuary at Mazatlan, not yet noticed elsewhere; all the specimens of *Lythrulon* from other localities examined by us being referable to *L. flaviguttatum*. Described from a specimen 9 inches long from Mazatlan. The species is probably not rare, but has been confounded with the preceding. (*opalescens*, opal-like, referring to the pearly spots.)

Lythrulon opalescens, JORDAN & STARKS, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 459, pl. 40, Mazatlan (Type, No. 2963, L. S. Jr. Univ. Mus. Coll. Hopkins Exped. to Sinaloa).

541. ORTHOSTŒCHUS, Gill.

(STRIPED GRUNTS.)

Orthostœchus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 255 (*maculicauda*).

This genus is closely allied to *Hæmulon*, differing most obviously in the arrangement of the large scales, which are throughout in series parallel with the lateral line; the fins are long and low, the gill rakers rather numerous, the chin projecting; the skull not essentially different from that of *Hæmulon*. One species. (ὀρθός, straight; στοῖχος, row.)

1680. ORTHOSTŒCHUS MACULICAUDA, Gill.

(RONCADOR RAIADO.)

Head $3\frac{1}{8}$; depth $2\frac{6}{7}$; eye large, $3\frac{3}{4}$ in head in adult. D. XIII (rarely XIV), 15; A. III, 10; scales $5\frac{1}{2}$–51–11. Body oblong-elliptical, not much compressed; the back little elevated. Head rather large, moderately pointed anteriorly; the profile nearly straight from the snout to the nape; snout short, low, rather pointed, its length $3\frac{1}{2}$ in head; mouth small, a little oblique, the maxillary extending to front of pupil, its length $2\frac{1}{5}$ in head;

lower jaw slightly included. Teeth small, the outer and posterior little enlarged. Preorbital narrow, its least breadth $7\frac{2}{3}$ in head; interorbital space moderate, convex, $3\frac{4}{5}$ in head; preopercle moderately serrate. Gill rakers slightly longer and more numerous than in most species of *Hæmulon*, about 16 on lower part of arch, the longest about $\frac{1}{2}$ depth of preorbital. Scales large, very uniform in size over the body, arranged above as well as below lateral line, in longitudinal series, those above lateral line being everywhere parallel with the lateral line; soft fins scaly, as usual. Dorsal spines usually 13, but sometimes 14, rather slender and low, the longest $2\frac{1}{10}$ in head; soft dorsal low, the longest rays $3\frac{1}{2}$ in head; caudal moderate, the upper lobe $1\frac{3}{5}$ in head; anal rather low, the longest rays not reaching, when depressed, to middle of last rays, their length about 3 in head; second anal spine stronger and longer than third, $2\frac{1}{3}$ in head, its tip about reaching base of last ray; ventrals $1\frac{3}{4}$ in head; pectorals $1\frac{1}{5}$. Frontal foramina narrowly oval, wholly separate, some distance in front of the low supraoccipital crest. Color dark brown; each scale of back and sides with a light pearly-gray spot on its middle, these coalescing into continuous light stripes which are sharply defined, one for each row of scales; head plain; fins plain grayish; a large dusky area on base of caudal. Its peculiar squamation, rendered more noticeable by the corresponding features of coloration, gives it an appearance quite distinct in this genus. The snout is shorter than usual and the number of dorsal spines is increased. In other respects it departs less from the usual type than does *Lythrulon flaviguttatum* or even *Bathystoma striatum*. The cranium is of the usual *Hæmulon* type. Pacific coast of tropical America, Guaymas to Panama; rather common; here described from No. 29256, U. S. N. M., $8\frac{1}{5}$ inches long, from Panama. Length about a foot. (*macula*, spot; *cauda*, tail.)

Orthostœchus maculicauda, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 255, Cape San Lucas (Coll. Xantus).

Hæmulon mazatlanum, Steindachner, Ichth. Notizen, VIII, 12, pl. VI, 1869, Mazatlan.

Hæmulon maculicauda, Steindachner, Ichth. Beiträge, III, 14, 1875; Jordan & Swain, *l. c.*, 315; Evermann & Jenkins, Proc. U. S. Nat. Mus. 1891, 152; Jordan & Fesler, *l. c.*, 480.

Diabasis maculicauda, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 362, 372, 626.

542. ANISOTREMUS, Gill.

Anisotremus, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 107 (*virginicus*).

Genytremus, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 256 (*bilineatus*).

Paraconodon, Bleeker, Archiv Neerl. XI, 272, 1876 (*pacifici*).

Body ovate, short, deep, and compressed; mouth rather small, with thick lips, the maxillary rather short; inside of mouth not red; teeth in jaws only, all pointed, those of the outer series in upper jaw enlarged; chin with a median groove, besides smaller pores. Dorsal spines strong; soft rays of dorsal and anal scaly at base; anal spines strong; caudal mostly lunate. Scales large. Lower pharyngeals broad, with coarse, blunt teeth. This genus, like *Hæmulon*, to which it is closely related, contains numerous species, all of them living on the shores of tropical America. All the species undergo considerable change in form with age, and all of them are valued as food-fishes. The young are marked with 2 or 3 blackish lengthwise stripes. These disappear with age, quickest in the brightly colored species, and persist for a long time in species like *bilineatus* and *interruptus*, which agree in coloration with *Hæmulon parra* and related species. (ἄνισος, unequal; τρῆμα, aperture, from the pores at the chin).

PARACONODON, Bleeker (*παρά*, near; *Conodon*):

a. Scales above lateral line in series parallel with the lateral line.

  b. Dorsal spines rather low, the longest not more than ½ length of head; second anal spine about ½ head.

    c. Pectorals much shorter than head, not reaching tips of ventrals; dorsal rays XI, 13, the spines comparatively slender, the longest ½ head; eye more than twice as wide as the narrow preorbital. PACIFICI, 1681.

    cc. Pectorals a little longer than head, about reaching anal fin; dorsal rays XII, 16, the spines short and stout, the longest 2½ in head; eye 3, about ¼ wider than the broad preorbital. CÆSIUS, 1682.

  bb. Dorsal spines very high, the longest 1⅗ in head: second anal spine very long, about 1¾ in head; pectorals much shorter than head: interorbital area much less than width of orbit; snout obtuse, not much longer than eye; cleft of mouth small, the maxillary extending to front of eye; dorsal and anal spines exceedingly strong, the third dorsal spine the longest; snout naked, the remainder of the head being scaly; each ray of the soft fins accompanied by a series of minute scales, covering the caudal; caudal fin slightly emarginate. DOVII, 1683.

ANISOTREMUS:

aa. Scales above lateral line arranged in oblique series which are not parallel with it.

  d. Scales comparatively large, less than nine in a vertical series between first dorsal spine and the lateral line; coloration olivaceous, the adult nearly plain, the young with 2 or more dusky lateral stripes which disappear with age; fins blackish.

    e. Scales 5 or 6–52–15 (lateral line with 49 pores); scales above lateral line on anterior part of body more or less enlarged, especially in the adult.

      f. Scales above lateral line not much enlarged, about 9 in an oblique series from first dorsal spine to lateral line; profile of head anteriorly rounded. SURINAMENSIS, 1684.

      ff. Scales above lateral line very much enlarged, especially in the adult, about 7 rows from first dorsal spine obliquely backward to lateral line; profile steeper and less curved. INTERRUPTUS, 1685.

    ee. Scales 7 or 8–46–15 (lateral line with 54 pores), scales above lateral line anteriorly not especially enlarged. BICOLOR, 1686.

  dd. Scales rather small, more than 9 in a vertical series between the first dorsal spine and the lateral line.

    g. Body not striped longitudinally with yellow or blue; preorbital narrow; gill rakers $x+13$.

      h. Anterior part of body without jet-black vertical bar; axil jet-black, the spot encroaching on base of pectoral; a round black spot on base of last rays of dorsal and anal; body dark gray, with obscure darker streaks; fins pale, edge of opercle dusky; pectoral long, 1⅒ in head, reaching front of anal. SCAPULARIS, 1687.

      hh. Anterior part of body with a black vertical bar.

        i. Body without lengthwise stripes; dark humeral bar jet-black, extending from between the fifth and seventh dorsal spines to opposite the lower edge of the pectoral; edge of opercle and base of pectoral black; pectoral long. DAVIDSONII, 1688.

ii. Body with 2 lengthwise bands; humeral bar brownish; a dark caudal spot, and a spot on back of caudal peduncle. SPLENIATUS, 1689.

gg. Body with longitudinal stripes of blue or yellow or both; young with a black blotch at base of caudal; preorbital broad; gill rakers $x+16$.

j. Anterior part of body with 2 broad, dark crossbars, the one from the nape obliquely forward through eye, the other from front of dorsal downward; behind these a series of horizontal stripes alternately yellow and blue; pectoral longer than head; second anal and fourth dorsal spines nearly equal.

k. Blue stripes on side about 6 in number, very distinct, not nearly as wide as a scale; sharply edged with darker blue, their width about ⅓ that of the olive interspaces; additional blue stripes in the interspaces faint and few; vertical bands of head and shoulder brown. TÆNIATUS, 1690.

kk. Blue stripes on side as broad as a scale, each more than ⅔ the width of the golden-yellow interspaces, and each very faintly edged with darker; vertical bands on head and shoulder jet-black. VIRGINICUS, 1691.

jj. Anterior part of body without dark crossbars, the body sometimes plain yellowish, the back usually violet, with 4 or 5 yellow lines; silvery below; snout short, not longer than width of eye; dorsal fin very deeply notched, with feeble spines; second and third anal spines equal in length; body a little more oblong than in *surinamensis*. SERRULA, 1692.

Subgenus PARACONODON, Bleeker.

1681. ANISOTREMUS PACIFICI (Günther).

Head 3⅕; depth 2⅖ to 2¾. D. XI, 13; A. III, 10; scales 7–47–13; second anal spine 2 in head; fifth dorsal spine 2; pectoral 4½. Scales above lateral line in series parallel with it. Dorsal spines rather low, the longest not more than ½ length of head; second anal spine about ½ head; pectorals much shorter than head, not reaching to tips of ventrals; eye more than twice as wide as the narrow preorbital. Body compressed, considerably elevated, the greatest height below the fifth dorsal spine; profile rounded from base of first dorsal spine to the nape, concave over the eye, descending abruptly down the snout; interorbital area twice orbit; snout thick and obtuse; teeth in a villiform band in both jaws, with an outer series of conical teeth; preopercle serrate strongly on angle; a posterior notch in opercle between 2 obtuse and feeble points; soft dorsal about as high as spinous; second anal spine long and strong; caudal emarginate. Color dusky-grayish, with four irregular crossbands, which grow faint with age; scales silvery with purple reflections; membrane between the scales brown; fins blackish. Pacific coast of Central America; a small, plain-colored species, rather common about Panama. (Named for Pacific Ocean.)

Conodon pacifici, GÜNTHER, Proc. Zool. Soc. London 1864, 147, Chiapas.
Pomadasis pacifici, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 385.
Anisotremus pacifici, JORDAN & FESLER, *l. c.*, 484.

1682. ANISOTREMUS CÆSIUS (Jordan & Gilbert).

Head 3⅕; depth 2⅓; eye 3½; snout about 3; maxillary 3¼. D. XII, 16; A. III, 9; scales 6–52–13. Body ovate, compressed, the back rather strongly arched; anterior profile rather steep and straightish, gibbous between eyes and also behind them, slightly depressed above eyes and at nape; ventral outline considerably arched; caudal peduncle moderate, about ½ as long as head, and somewhat longer than deep. Head short and deep, deeper than long; snout very short, blunt, and thick; mouth very small, the maxillary not quite reaching to front of eye. Teeth cardiform, in broad bands, the outer series enlarged, but smaller than in *A. pacifici*. Eye large, shorter than snout, about ¼ wider than the broad preorbital; lips thick; chin with a median furrow and 2 pores; lower jaw included; anterior nostril much larger than posterior; preopercle rather weakly serrate, its upright limb somewhat concave. Gill rakers short and weak, about 10 on lower limb of arch. Scales rather large, arranged as in related species, those above the lateral line forming series parallel with the back, but placed so that the crossrows are very oblique; soft parts of vertical fins almost entirely covered with small scales; series of scales also on membrane of pectorals and ventrals; scaly sheath of vertical fins well developed. Dorsal fin low, rather deeply emarginate, its spines very strong, the second spine slightly longer than the eye and ⅔ the height of the third, which is but little shorter than the fourth or longest, and about ⅖ length of head; soft rays more than ⅔ height of longest spines; caudal rather large, moderately forked, the upper lobe somewhat the longer, about ⅘ length of head; anal rather low, its distal margin perfectly straight, vertical; second anal spine very robust, ½ length of head, ½ longer than the third spine, which is much lower than the soft rays; ventral fins 1⅓ in head, about reaching vent; pectoral fins long, subfalcate, a little longer than head, nearly or quite reaching anal. Color in life, grayish, silvery above, with yellowish tinge; lower part of sides with indistinct darker streaks, formed by clusters of dark points on the margins of the scales; a faint dark bar, most distinct in the youngest specimens, extending from the region in front of the dorsal to, or a little below, the base of pectorals. In young specimens this bar is as wide as the eye, growing narrower below, but in the adult it is scarcely wider than the pupil; no trace of the black crossbars seen in *A. dovii* and in *A. pacifici*, nor of the dark spots seen in *A. surinamensis*, nor of the blue stripes of *A. tæniatus;* vertical fins and pectorals dusky-yellowish; distal half of ventrals and base of anal blackish; upper part of head dusky, especially between eyes; lining of opercle pale, with yellow patches in life; peritoneum white. Pacific coast of Mexico; known from 3 specimens from the harbor of Mazatlan and 1 from Acapulco. The type 9⅘ inches long. (*cæsius*, silver gray.)

Pomadasys cæsius, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 383. (Type, Nos. 28158, 28333, and 29632, U. S. N. M. Coll. C. H. Gilbert.)
Anisotremus cæsius, JORDAN & FESLER, *l. c.*, 484, 1893.

1683. ANISOTREMUS DOVII (Günther).

Head 3; depth 2. D. XII, 16; A. III, 9; scales 8-48-15. Second anal spine 1¾; third dorsal spine 1⅗. Body rather deep and compressed. Dorsal spines very high, the longest 1⅗ in head; second anal spine very long, about 1¾ in head; pectorals much shorter than head; interorbital area much less than width of orbit; snout obtuse, not much longer than eye; cleft of mouth small, the maxillary extending to front of eye; dorsal and anal spines exceedingly strong, the third dorsal spine the longest; snout naked, the remainder of the head being scaly; each ray of the soft fins accompanied by a series of minute scales, covering the caudal; caudal fin slightly emarginate. Color grayish-silvery, with 5 jet-black crossbands in the adult; fins blackish. A strongly marked and handsome species. Length 1 foot. Pacific coast of tropical America; not rare at Mazatlan and Panama. (Named for Capt. John M. Dow, its discoverer.)

Pristipoma dovii, GÜNTHER, Proc. Zool. Soc. London 1864, 23, Panama.
Pomadasis dovii, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 386.
Anisotremus dovii, JORDAN & FESLER, *l. c.*, 484, 1893.

Subgenus ANISOTREMUS, Gill.

1684. ANISOTREMUS SURINAMENSIS (Bloch).

(POMPON.)

Head 3; depth 2½; eye 4 in head; snout 2¾. D. XII, 16; A. III, 8 or 9; scales 6-(9 in oblique series)-52-14 or 15, lateral line with 49 pores. Second anal spine 1⅞; fourth dorsal spine 2; pectoral as long as head. Body oblong-elliptical, the back elevated, the profile strongly convex at nape, becoming straighter anteriorly; interorbital area a little more than eye; snout rather sharp; mouth short, lips very thick, the maxillary extending to anterior edge of eye; outside teeth of jaws conical, notably longer and stronger than the others; preopercle evenly serrate on vertical edge, weaker at angle; dorsal and anal spines strong, second anal stronger and a little longer than the highest dorsal spine, about ½ head; soft dorsal lower, about ⅓ head; pectoral falcate, as long as head; caudal forked. Scales above lateral line arranged in oblique series which are not parallel with it; scales above lateral line on anterior part of body more or less enlarged, especially in the adult, fewer than 6 to 8 rows in a vertical series between first dorsal spine and lateral line. Adult gray, with a dark spot at the base of each scale on anterior part of back; fins all dark, no distinct opercular spot. Young with 2 black horizontal stripes, one of these from eye to a point just before the base of caudal, where it is interrupted, a round black spot following at base of caudal; another stripe above this and parallel with it; scales of anterior part of back more or less distinctly marked with black spots, one on each scale, these spots not confluent. Length 2 to 3 feet. Tropical America, from Florida to Brazil, recently taken by Evermann & Bean in Indian River; perhaps also occurring on the Pacific coast, as specimens from the Galapagos are very similar to those from Cuba, and perhaps referable rather to *surinamensis* than to *interruptus*. The species probably passes by degrees into *Anisotremus interruptus*, from the Galapagos northward. This species is the most widely distributed of any of the genus. It reaches a larger size than the others and is subject to considerable variation in form.* (*surinamensis*, from Surinam.)

Lutjanus surinamensis, Bloch, Ichthyol., pl. 253, 1791, Surinam.
Holocentrus gibbosus, Lacépède, Hist. Nat. Poiss., IV, 344, 1803, Surinam; after Bloch.
Pristipoma bilineatum, Cuvier & Valenciennes, Hist. Nat. Poiss., V, 271, 1830, Martinique.
Pristipoma melanopterum, Cuvier & Valenciennes, Hist. Nat. Poiss., V, 273, 1830, Brazil.
Hæmulon obtusum, Poey, Memorias, II, 182, 1860, Havana.
Hæmulon labridum, Poey, Memorias, II, 419, 1861, Cuba.
Pristipoma surinamense, Cuvier & Valenciennes, Hist. Nat. Poiss., V, 273, 1830.
Anisotremus bilineatus, Jordan, Proc. U. S. Nat. Mus. 1890, 319.
Anisotremus surinamensis, Jordan & Fesler, *l. c.*, 484, 1893; Evermann & Bean, Report on the Fisheries of Indian River, Florida, Senate Doc. 46, 54th Cong., 2d ses., 22, 1897.

1685. ANISOTREMUS INTERRUPTUS (Gill).

(Mojarron.)

Head 3; depth 2⅓. D. XII, 16; A. III, 8 or 9; scales 5– (7 or 8 in oblique series) –52–12; pores 48. Form of *Anisotremus surinamensis*, the profile rather steeper and less curved; scales above lateral line considerably more enlarged; in other characters entirely similar to *A. surinamensis*. Adult in life, grayish anteriorly, yellow on posterior half; the back tinged with brassy olive, which grows darker behind, the posterior parts pretty distinctly yellow; fin spines gray, the soft fins olive, the fins growing dusky at tip; scales on back and sides each with a distinct black spot; iris yellow. Young specimens with 2 black horizontal stripes, one of these from the eye to a point just before base of caudal, where it is interrupted, a round black spot following at base of caudal; another stripe above this and parallel with it; scales of anterior parts with round brown spots, not confluent. Length 2 to 3 feet. Pacific coast about rocky islands from Magdalena Bay to Panama and the Galapagos; probably varying into the preceding, from which the Galapagos specimens are hardly separable. A common food fish. (*interruptus*, broken, from the lateral stripe in the young.)

Genytremus interruptus, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 256, young, Cape San Lucas (Coll. J. Xantus).
Pristipoma furthi, Steindachner, Ichth. Beitr., V, 4, 1876, Panama (Coll. Ignatius Fürth); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1881, 385.
Anisotremus surinamensis interruptus, Jordan & Fesler, *l. c.*, 484, 1893.

1686. ANISOTREMUS BICOLOR (Castelnau).

(Maria-Prieta.)

Head 3; depth 2⅕. D. XII, 16; A. III, 8; scales 7 or 8–46–15; lateral line with 54 pores; eye 2⅔; snout 4½; preorbital 4; pectoral 1. Scales above lateral line anteriorly not specially enlarged; all specimens examined with 3 or 4 black lateral stripes, one from eye to near base of caudal, where it ceases abruptly, giving place to a round caudal spot as in the young of *A. surinamensis,* also a stripe from scapular scale to last dorsal ray forming 2 spots on back of caudal peduncle (this stripe wanting in *A. surinamensis*); above this 1 or 2 other stripes parallel with it; opercular membrane black. Anterior profile considerably steeper than in *A. surinamensis.* In all other respects, in specimens of the same age, this species seems to agree with *A. surinamensis.* Coast of Brazil. Specimens examined by us from Rio Grande do Norte, Bahia,* and Ceara. Also found in Cuba if *Anisotremus trilineatus* is really the same species. (*bicolor,* two-colored.)

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* *Anisotremus interruptus*, Gill. Pacific coast examples usually have the scales above the lateral line a little larger than usual in Atlantic specimens, but this difference seems to be variable. We have compared specimens from Havana, Bahia, and Rio Janeiro with *interruptus* from Mazatlan, Magdalena Bay, Panama, and the Galapagos. Specimens from the Galapagos are darker in color and with the snout rather sharper than others seen. Those from Galapagos and from Rio Janeiro have the scales above the lateral line a little less enlarged, 9 in an oblique series, downward and backward from first dorsal spine (7 in Panama specimen, 8 in specimen from Magdalena Bay).

Pristipoma bicolor, CASTELNAU, Anim. Nouv. ou Rares Amer. du Sud, 8, pl. 2, fig. 2, 1850, Bahia.
?*Pristipoma trilineatum,*† POEY, Memorias, II, 343, 1861, Havana.
Pristipoma brasiliense, STEINDACHNER, Sitzungsb. k. Akad. Wiss. Wien. 1863, 1013, Bahia.
Anisotremus bicolor, JORDAN, Proc. U. S. Nat. Mus. 1890, 319; JORDAN & FESLER, *l. c.*, 485.

1687. ANISOTREMUS SCAPULARIS (Tschudi).

Head 3; depth $2\frac{1}{3}$; eye 4; snout 4. D. XI, 14; A. III, 13; scales 9 or 10–51–10; preorbital equal pupil; maxillary $3\frac{1}{3}$; pectoral $1\frac{1}{10}$; gill rakers 10 + 13. Body ovate, the back elevated, the profile from tip of the short, blunt snout to last dorsal ray evenly rounded; lower profile straighter, angulated at end of base of anal; mouth moderate; teeth in broad bands, the outer in each jaw longer, close set, slender, and sharp; preopercle rather finely, but not sharply, serrate. Scales rather small, more than 9 in a vertical series between first dorsal spine and lateral line. Dorsal fin divided almost to base, the tenth spine no longer than first; second anal spine stronger and a little longer than third, lower than soft rays; caudal forked. Anterior part of body without jet-black vertical bars; axil jet-black, the spot encroaching on base of pectoral; a round, black spot on base of last rays of dorsal and anal; body dark gray, with obscure, darker streaks; fins pale; edge of opercle dusky. Coast of Peru; not rare; said to have once been taken at Mazatlan. We have examined several specimens from Callao. It has the central pore at the chin, the failure to find which led Kner to place the species in *Diagramma*. It seems to be identical with Peters' type of *P. notatum*, preserved in the museum at Berlin, though it disagrees with Peters' description, the dorsal rays being XII, 15, not XVIII–I, 15, as stated by Peters. This species is probably the one poorly described by Tschudi under the name of *Pristipoma scapulare*. It is well distinguished by the color mark, which has suggested the names *scapularis*, *melanospilus*, and *notatus*. (*scapula*, shoulder, from the shoulder spot.)

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* A specimen from Bahia shows the following characters: Pectorals sharp, $1\frac{1}{15}$ in head, not quite to anal; second anal spine very strong, $2\frac{1}{10}$ in head, equal to longest dorsal spine. Eye large, 3 in head; snout short, rather blunt; profile steep. Dorsal XII, 16; anal III, 8. Scales 53. Gray; a black median line on back; 5 equidistant black stripes as wide as interspaces on side, straight and horizontal, the first ending under ninth dorsal spine, the second under middle of soft dorsal, the third running from upper edge of gill opening to last dorsal ray, with 2 black spots behind it on back of tail, the fourth on axis of body, ceasing on caudal peduncle, with a round black spot behind it at base of caudal as large as pupil; fifth stripe very obscure, with a trace of a sixth one; a black blotch at base of anal, not on the fin; a large black blotch nearly as large as pupil on opercular flap; 2 silvery horizontal stripes on the dusky shade of cheeks; fins plain grayish, the ventrals black, the anal dusky, axil dusky. Scales above lateral line in series not parallel with it; 6 or 7 scales in a vertical series below lateral line.

† *Anisotremus trilineatus* (Poey). Head $3\frac{3}{4}$ in total with caudal; depth $3\frac{1}{2}$; D. XII, 18; A. III, 8. Eye in second third of head. Preopercle well serrate; maxillary reaching front of pupil. Teeth in villiform bands, the outer enlarged above; snout scaleless. Dorsal notched, the membrane of spinous part long; second anal spine longer than third, not robust. Color golden gray, with somewhat oblique streaks along the rows of scales; 2 dark bands along body; 1 from snout through eye to a dark spot at base of caudal; 1 on the back to tip of snout, not joined to its fellow; a narrower dark streak along lateral line, vanishing behind, extending forward to the eye; fins pale yellow; sides of head with silvery reflections. Length .70 m. Havana (Poey); not seen by us. Probably young of *Anisotremus bicolor.* (*trilineatus,* three-lined.)

Pristipoma scapulare, TSCHUDI, Fauna Peruana, 12, 1844, Huacho.
Diagramma melanospilum, KNER, Sitzungsb. k. Akad. Wissenchaft 1867, 4, west coast of South America.
Pristipoma notatum, PETERS, Berl. Monatsb. 1869, 706, "angeblich aus Mazatlan."
Pomadasys modestus, JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 286; not of TSCHUDI.
Anisotremus scapularis, JORDAN & FESLER, *l. c.*, 485, 1893.

1688. ANISOTREMUS DAVIDSONII (Steindachner).

(SARGO RAIADO.)

Head 3¼; depth 2½ to 2⅔. D. XII, 16 or 15; A. III, 11; scales 11–62–21. Eye 4½ in head; snout 3; preorbital 5½; maxillary 3⅔; second anal spine 2¼ to 2½; fourth dorsal 2⅒; pectoral ⅞ or equal to head; gill rakers 9 + 13. Body elongate-ovate, the back elevated, the anterior profile straightish to nape, thence regularly convex; lower profile straight, angulated at anal; mouth small; teeth setiform, arranged in broad bands, becoming shorter behind, longer and stronger in front; dorsal fin deeply notched, the tenth spine twice as long as first; second anal spine much stronger and almost twice as long as third, higher than soft rays; caudal forked; pectoral as long or longer than head. Scales rather small, more than 9 in a vertical series between the first dorsal spine and the lateral line. Grayish-silvery, dark above, with many dark points; a very distinct jet-black cross-band on back and sides, this extending from between the fifth and seventh dorsal spines to opposite the lower edge of the pectoral; edge of opercle and base of pectoral black; fins otherwise dull yellowish. Coast of southern California, not rare about San Diego and the Santa Barbara Islands. It has not been taken elsewhere. (Named for Prof. George Davidson, of San Francisco, the well-known astronomer.*)

Pristipoma davidsonii, STEINDACHNER, Ichth. Beiträge, III, 6, 1875, San Diego, California; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 385.
Pomadasys davidsoni, JORDAN & GILBERT, Synopsis, 551, 1883.
Anisotremus davidsoni, JORDAN & FESLER, *l. c.*, 486, 1893.

1689. ANISOTREMUS SPLENIATUS (Poey).

Head 4 in total with caudal; depth 2¾. D. XII, 16; A. III, 10. Maxillary not reaching front of eye; 2 pores and a groove at the chin; preopercle with small spines well separated; no scales on snout; teeth in villiform bands. Fourth dorsal spine 3 in depth of body; soft dorsal low; caudal forked. Cœca 4. Snout rose-colored; rest of head, nape, and back golden-yellow, as are the belly and base of anal; rest of body lead-color, with 2 brown bands, first midway between lateral line and back, the other from eye to tail, ending in a black spot as large as eye at base of caudal; a gilt streak along lateral line, another along belly, the two marking edge of caudal peduncle; a broad blackish vertical band from first ray of dorsal to base of pectoral; fins bright orange, especially caudal and anal; spinous dorsal and ventral with membranes blackish; a dark spot on median line of tail behind dorsal. Iris brown. Length 4 inches. Havana (Poey); not seen by us. A species of uncertain relationship. (*spleniatus*, bearing patches.)

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* "Benannt zu Ehren meines hochverehrten Freundes, Prof. George Davidson, Präsidenten der California Academy of Natural Sciences, welcher um die naturhistorische Erforschung Californiens so bedeutende Verdienste sich erworben hat." (Steindachner.

Pristipoma spleniatum, POEY, Memorias, II, 187, 1860, Havana.

1690. ANISOTREMUS TÆNIATUS, Gill.

(CATALINA.)

Head $3\frac{1}{5}$; depth $2\frac{1}{10}$. D. XII, 16; A. III, 10; scales 10–56–17; eye $3\frac{1}{2}$ in head; snout $2\frac{7}{8}$; preorbital 4; maxillary $3\frac{1}{4}$; second anal spine $1\frac{3}{4}$; fourth dorsal spine $1\frac{7}{8}$; pectoral $\frac{7}{8}$; gill rakers $8 + 16$. Body ovate, the back much elevated, the anterior profile steep, convex on snout, straightish over eye, nape very convex to base of third dorsal spine; mouth moderate, the maxillary extending to anterior edge of eye; jaws subequal; teeth arranged in bands, the outer much enlarged; about 10 gill rakers, besides rudiments, below angle; dorsal fin high, slightly emarginate; spines slender, the highest slightly shorter and weaker than the second anal spine, which is more than $\frac{1}{2}$ head; caudal emarginate, the upper lobe the longer. Body with about 6 longitudinal stripes of brilliant blue on a bright golden ground, those on side very distinct, not nearly as wide as a scale, sharply edged with darker blue, their width about $\frac{1}{3}$ that of the olive interspaces; additional blue stripes in the interspaces faint and few; and oblique brown band from nape through eye, broad vertical bands at shoulder, these much less distinct than in *A. virginicus;* fins golden yellow. Young with a black blotch at base of caudal. Pacific coast of tropical America, Magdalena Bay to Panama. The most brilliantly colored of the genus, common on the Pacific coast of Mexico and Panama, where it replaces the closely allied *Anisotremus virginicus.* The differences between the two species, though slight, seem to be constant. (*ταινία*, a ribbon; *tæniatus*, striped.)

Anisotremus tæniatus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 107, Panama (Coll. Captain Dow); JORDAN & FESLER, *l. c.*, 486.

1691. ANISOTREMUS VIRGINICUS (Linnæus).

(PORKFISH; CATALINETA.)

Head $3\frac{1}{8}$; depth $2\frac{1}{10}$. D. XII, 17; A. III, 10 or 11; scales 11–56–17; eye $4\frac{1}{8}$; snout $2\frac{1}{2}$ to 3; preorbital 4; maxillary $3\frac{1}{2}$; second anal spine $2\frac{1}{10}$; third dorsal spine $2\frac{1}{10}$; pectoral $\frac{7}{8}$; gill rakers $7 + 16$. Body ovate, the back very much elevated, the anterior profile steep, slightly convex along snout and over eye, very much arched at nape; mouth small, the maxillary extending to anterior nostril; jaws subequal; outer row of teeth enlarged; about 6 gill rakers, besides rudiments, below angle; dorsal fin low, emarginate, spines slender, the highest about equal in length to second anal spine, which is less than ½ head; caudal forked. Oblique bar from nape through eye, and vertical bar downward from dorsal, jet-black; space before anterior bar deep yellow; interspace between bars pearly gray, with yellow spots, the spots confluent above into a yellow area; ground color of body plain pearly gray, with about 7 deep-yellow longitudinal stripes; the pearly interspace not edged with darker and not distinctly blue; all the fins deep yellow; iris gilt gray. A very young specimen showed the following coloration in life; pale anterior region, from lower jaw and temporal region to spinous dorsal bright yellow; spinous dorsal, ventrals, and front of anal deep golden; other fins pale; a large round jet-black spot at base of caudal; a dark band from front of spinous dorsal downward, and 2 black stripes along sides, one from nape to last ray of dorsal and one from the eye nearly to the caudal spot. Florida to Brazil; the commonest of the genus in the West Indies, and the only one except *A. surinamensis* which extends its range to the coast of Florida. (Name from Virginia, but the species does not reach thus far to the northward.)

Guatucupa juba, MARCGRAVE, Hist. Brasil., 148, 1648, Brazil.
Acara pinima, MARCGRAVE, Hist. Brasil., 152, 1648, Brazil.
Sparus virginicus, LINNÆUS, Syst. Nat., x, 281, 1758, South America.
Sparus vittatus, BLOCH, Ichthyol., taf. 263, fig. 2, 1791, Brazil; after MARCGRAVE'S *Acara pinima.*
Perca juba, BLOCH, *l. c.*, taf. 308, fig. 2, 1791, Brazil; after MARCGRAVE'S *Guatucupa juba.*
Grammistes mauritii, BLOCH & SCHNEIDER, Syst. Ichthyol., 185, 1801; after *Sparus vittatus* of BLOCH.
? Pristipoma catharinæ, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 269, 1830, St. Catharine Island, Brazil.
Pristipoma rodo, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 274, 1830, Martinique, Brazil, Puerto Rico, and San Domingo.
Pristipoma acara pinima, CASTELNAU, Anim. Nouv. ou Rares, 8, 1856, Brazil.
Pristipoma virginicum, GÜNTHER, Cat., I, 288.
Anisotremus virginicus, GILL, Proc., Ac. Nat. Sci. Phila. 1861, 107; JORDAN, Proc. U. S. Nat. Mus. 1890, 319; JORDAN & FESLER, *l. c.*, 486.
Pomadasys virginicus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 385.

1692. ANISOTREMUS SERRULA (Cuvier & Valenciennes).

(TÊTE-DE-ROCHE; PETITE-SCIE.)

Dorsal XII, 13; A. III, 9. Body a little more oblong than in *Anisotremus surinamensis.* Snout short, not longer than width of eye; dorsal fin very deeply notched, with feeble spines; second and third anal spines equal in length. Anterior part of body without dark crossbars, the body sometimes plain yellowish, the back usually violet, with 4 or 5 yellowish lines; silvery below.* Martinique (Cuvier & Valenciennes); not seen by

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*Except for the presence of the groove at the chin, as implied in the description of Cuvier & Valenciennes, we might suppose *Anisotremus serrula* to be identical with *Genyatremus luteus.*

us. (*serrula*, a little saw, a translation of the French name "Petite-Scie," used at Martinique.)

Pristipoma serrula, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 272, 1830, Martinique.
Pristipoma auratum, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 272, Martinique.
Anisotremus serrula, Jordan & Fesler, *l. c.*, 487.

543. CONODON, Cuvier & Valenciennes.

Conodon, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 156, 1830 (*antillanus*=*nobilis*).

This genus is close to *Pomadasis*, from which it is separated by the enlarged outer teeth and by the peculiar armature of the preopercle, which is very sharply serrate, the serræ at the angle enlarged, those before the angle turned forward. Body oblong; soft rays of dorsal and anal more or less scaly; second anal spine large. American. (*κῶνος*, cone; *ὀδών*, tooth.)

a. Back distinctly elevated and compressed, the depth 3⅙ in body; dorsal fins low, fourth spine the longest, 1¾ in head; longest dorsal ray 2¼ in head; outer teeth much enlarged. NOBILIS, 1693.

aa. Back not elevated, the depth 3⅖ in body; dorsal fin higher than in *nobilis*, fourth spine the longest, 2⅙ in head; longest dorsal ray 3 in head; outer teeth little enlarged. SERRIFER, 1694.

1693. CONODON NOBILIS (Linnæus).

Head 3⅙; depth 3⅙. D. XI—I, 13; A. III, 7; scales 6-55-13. Back distinctly elevated and compressed, the depth about equal to length of head; dorsal fins low, fourth and longest spine 1¾ in head, longest dorsal ray 2¼ in head; second anal spine very long and strong, higher than the soft rays, more than ½ length of head; second dorsal spine about ½ length of third; pectorals narrow, about reaching vent; teeth of outer series enlarged, stout; preorbital at its least width more than ½ diameter of eye. Air bladder with 2 short horns in front. Color silvery, darker above, with 8 dark bars, which extend on sides below level of pectoral; sides with light yellowish streaks in life; dorsal spines silvery. West Indies; coast of Texas to Brazil; on sandy shores. Length about a foot. This species is not rare in the West Indies, and is more common on the coast of Brazil. (*nobilis*, noble.)

Perca nobilis, Linnæus, Syst. Nat., Ed. x, 191, 1758, North America.
Sciæna plumieri, Bloch, Ichthyol., vi, 66, taf. 306, 1791, Martinique.
Sciæna coro, Bloch, *l. c.*, pl. 307, fig. 2, 1791, Brazil; after *Coro coro*, Marcgrave.
Cheilodipterus chrysopterus, Lacépède, Hist. Nat. Poiss., iii, 542, pl. 33, fig. 1, 1802.
Conodon antillanus, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 156, 1830, Jamaica.
Pristipoma coro, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 266, 1830.
Conodon plumieri, Günther, Cat., i, 304, 1859.
Conodon nobilis, Jordan & Fesler, *l. c.*, 488.

1694. CONODON SERRIFER, Jordan & Gilbert.

Head 3⅖ in length to base of caudal; depth 3⅖. D. XI—I, 12; A. III, 7; scales 6–53–15. Body comparatively elongate, elliptical, little compressed, the dorsal and ventral outlines regularly and nearly equally curved, the back not much elevated and not specially compressed. Head rather short, broad, not very acute anteriorly, the profile nearly straight from snout to base of dorsal; snout short, about equal in length to the large eye, 3⅘ in head. Interorbital area broad and quite flat, its width 4⅕ in head. Mouth moderate, terminal, oblique, the lips moderately developed; maxillary extending to opposite front of eye, 2¾ in head; premaxillaries in front on level of middle of eye. Teeth in moderate bands, those in the outer series enlarged, but much less so than in *Conodon nobilis*, the teeth slenderer than in the latter; 2 teeth in front of lower jaw somewhat caninelike. Preorbital narrow, its least width about ⅖ diameter of eye; jaws equal in front; preopercle with its posterior margin somewhat concave, armed with strong teeth, which are directed backward and somewhat upward; angle of preopercle with a strong spine directed backward, its length about ½ length of eye; lower limb of preopercle with strong spinous teeth (as in the species of *Plectropoma*), directed forward and downward, becoming gradually smaller anteriorly; nostrils small, roundish, the anterior larger. Gill rakers rather slender, of moderate length. Scales rather irregularly arranged, those above lateral line forming series parallel with it, which are somewhat broken opposite the angulation of the lateral line; small scales on soft parts of dorsal and anal; dorsal fin low, divided almost to base, the spines rather strong; first and second spines short and slender, the second little more than ⅓ the height of the third; the fourth or longest 2⅙ in head; soft dorsal low, its longest rays 3 in head; caudal subtruncate, the upper rays longest, 1¾ in head; anal rather low, the second spine 2 in head, much longer and stronger than the third, which is little lower than the soft rays; pectoral pointed, 1⅒ in head; ventrals 1⅗. Color dusky bluish above, silvery below; sides of back with about 7 short black bars, each much narrower than the interspaces, the last under last rays of dorsal, all terminating below at the lower edge of the dark hue of the back; fins all pale. Length 8 inches. Lower California; known only from the original types, 3 specimens taken by Dr. Streets at Boca Soledad. It is close to *Conodon nobilis*, but slenderer and somewhat different in armature. (*serra*, saw; *fero*, I bear.)

Conodon plumieri, STREETS, Bull. U. S. Nat. Mus., VII, 50, 1877, Boca Soledad, west coast Lower California; not of CUVIER & VALENCIENNES.

Conodon serrifer, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 351, Boca Soledad, Lower California (Type, 17546, U. S. N. M. Coll. Dr. Streets); JORDAN & FESLER, *l. c.*, 488.

544. BRACHYDEUTERUS, Gill.

(BURRITOS.)

Brachydeuterus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 17 (*auritus*, an African species).

Hæmulopsis, STEINDACHNER, Ichth. Notizen, VIII, 9, 1869 (*corvinæformis*, a Brazilian species).

Body oblong; scales large, those above in series parallel with the lateral line; mouth small, outer teeth in jaws somewhat enlarged; inside of jaws not red. Anal spines small or moderate, the second little, if any, longer or stronger than third, and lower than the soft rays; soft dorsal and anal largely covered with small scales; dorsal spines 12; soft dorsal comparatively long, of 15 or 16 rays; otherwise essentially as in *Pomadasis*, the fins smaller and more scaly. (*βραχύς*, short; *δευτερός*, second; the typical species (*auritus*) was placed by Cuvier & Valenciennes in the *Sciænoid* genus *Larimus*, from which it was supposed to differ in the shorter second dorsal. The name would better apply to the short second anal spine.)

- *a.* Pectoral fins short, much shorter than head; anal spines very small.
  - *b.* Preorbital narrow, not as broad as eye.
    - *c.* Second anal spine shorter than the third; body rather elongate, the mouth small, the maxillary not quite reaching front of eye. A large blackish rounded blotch nearly as large as eye, behind the suprascapula, at the origin of the lateral line. NITIDUS, 1695.
    - *cc.* Second anal spine about equal to third in length, but stouter, 3 to 3¾ in head, relatively larger in smaller specimens; a diffuse dark blotch on scapular region, very faint in the larger specimens. CORVINÆFORMIS, 1696.
  - *bb.* Preorbital broad, wider than eye, 3⅕ to 4 in head; anal spines not graduated; maxillary not reaching the eye; sides with indistinct dark streaks or none; no dark scapular blotch. LEUCISCUS, 1697.
- *aa.* Pectoral fins long, nearly equal to head; preorbital broad, about as wide as eye. Body rather robust, the back elevated, the profile even. Axillary blotch large, black, encroaching upon the rays of the pectoral fin. AXILLARIS, 1698.

1695. BRACHYDEUTERUS NITIDUS (Steindachner).

Head 3¼; depth 3; eye 3¾; snout 3. D. XII, 15; A. III, 8; fourth dorsal spine 2; second anal spine nearly 4; pectoral 1⅖; scales 6 or 7–52–10. Body moderately elongate, compressed, the back evenly arched; head pointed, the mouth small, maxillary not reaching to eye; preorbital narrow, not so wide as eye; posterior edge of preopercle finely and evenly serrate; gill rakers short and slender, about 7+10. Dorsal not deeply notched, longest ray 1¼ in longest spine; anal spines very small, the second shorter than third; pectoral much shorter than head, not reaching much past tips of ventrals, which reach halfway to base of first anal ray; caudal lunate. Silvery, darker above, with dark streaks along the rows of scales, especially distinct below lateral line; a large round blotch at beginning of lateral line, about as large as eye; fins plain. Length 10 inches. Pacific coast of tropical America; known from Mazatlan, Panama, and the Gulf of California. (*nitidus*, shining.)

Pristipoma (Hæmulopsis) nitidum, STEINDACHNER, Ichth. Notizen, VIII, 5, pl. 3, 1869, Mazatlan, Mexico.

Pomadasis nitidus, JORDAN & FESLER, *l. c.*, 494; JORDAN, Fishes of Sinaloa, 462, 1895.

1696. BRACHYDEUTERUS CORVINÆFORMIS (Steindachner).

Head 3 to 3¼; depth 3¼; eye 3¾ to 4 in head; snout 2⅕ to 3. D. XII, 15; A. III, 7; scales 6–51–10. Upper profile regularly arched from snout to tail, the highest point at origin of dorsal; lower profile nearly straight to base of anal; preorbital slightly less than eye; maxillary not reaching eye, 3⅓ to 3⅖ in head; anterior nostril oval, twice the size of posterior; preopercle finely toothed, about 20 teeth on upper limb, increasing slightly in size toward angle; dorsal notched almost to base, fourth spine longest, 2⅛ to 2½ in head; longest soft ray (second) equal to or slightly less than longest spine; pectoral pointed, 1¼ to 1⅖ in head; ventral broad, the margin nearly straight, inner ray 1¼ in second, which is 2 in head; first ray branched once, slightly filamentous, other rays branched much; second and third anal spines about equal, 3 to 3¾ in head, relatively larger in smaller specimens, the second stouter; first soft ray 2½ in head; margin of anal slightly concave, the last ray shorter than second spine; upper lobe of caudal longer, the difference more noticeable in the smaller specimens, 1⅓ to 1½ in head, middle rays 1⅗ in upper; pectoral scaly at base only, other fins, except spinous dorsal, more or less completely scaled, a narrow sheath of scales on sides of dorsal and anal, supplementary scales slightly developed in axil of ventrals; least depth of caudal peduncle 1½ to 1⅗ in the length from below end of dorsal, its length being equal to middle caudal rays; lateral line and rows of scales above it concentric with back, scales below lateral line in horizontal rows. Color in alcohol: Dark olive above, lower sides more or less silvery, the larger specimens much the lighter; a dark line along each row of scales below lateral line, these rather indistinct in larger specimens; scales above lateral line with dark centers, these not forming distinct lines; a diffuse dark blotch on scapular region, very faint in the larger specimens; pectorals colorless, other fins punctate, the margins very dark. There is considerable variation in the ground color, the larger specimens being distinctly silvery, some of the smaller heavily washed with olive and having the scapular blotch more developed. Our specimens differ from Steindachner's description in having a rather shorter maxillary, not reaching eye, narrower preorbital, and a blotch on scapular region. They are, however, probably not specifically distinct. West Indies to Brazil; here described from 5 specimens 5½ to 7½ inches long, collected at Kingston, Jamaica, by Mr. Joseph Seed Roberts. (*Corvina*, a synonym of *Sciæna; forma*, form.)

Hæmulon corvinæforme, STEINDACHNER, Ichth. Notizen, VII, 16, 1868, Santos, Brazil.
Pomadasis corvinæformis, JORDAN & FESLER, Sparoid Fishes, 495, 1893.
Brachydeuterus corvinæformis, JORDAN & RUTTER, Fishes of Jamaica in Proc. Ac. Nat. Sci. Phila. 1897, 110.

1697. BRACHYDEUTERUS LEUCISCUS (Günther).

(BURRITO.)

Head 3; depth 3 to 3$\frac{1}{10}$. D. XII, 14 to 16; A. III, 7 or 8; scales 6–52–12; preorbital 3⅘ to 4 in head; orbit 4; snout 3; maxillary 3⅙; fourth dorsal spine 1⅞ in head; second anal spine variable, from 3 to 4; pectoral 1½; upper caudal lobe 1⅓. Body moderately elongate, deepest at shoulders; profile steep, but not greatly curved, slightly concave above eyes; mouth small, lower jaw slightly included, maxillary not reaching front of eye; preorbital wider than eye, interorbital flattish, 2⅔ orbit; preopercle sharply serrated; gill-rakers about half pupil, 5+12. Dorsal deeply notched, the last spine about twice as long as next to last; fourth spine longest, ½ longer than longest ray; second anal spine stouter, not much, if any, shorter than third, its tip, when depressed, reaching base of last ray; pectoral short, reaching past tips of ventrals, but not to vent; upper lobe of caudal the longer. Color grayish-silvery; a light lateral band, about one scale in width, beginning at posterior margin of opercle and extending backward in a direct line, meeting the lateral line under posterior fourth of soft dorsal, thence continuing to base of caudal chiefly below lateral line; center of each scale in the band with a faint dark blotch, these forming a rather distinct darker line through the middle of the light one; 3 other faint dark bands along side, 1 above and 2 below the light band; opercle with a yellowish tinge, a dark spot at angle; fins all light yellowish, soft dorsal mottled with blackish; a faint blotch on axil of pectoral. Pacific coast of tropical America; very common at Mazatlan and Panama, south to northern Peru; quite variable in depth of body, width of preorbital, and length of spines. Here described from a specimen 9 inches in length, from Rio Mulege, Lower California. (*leuciscus*, a chub or shiner, from λευκός, white.)

Pristipoma leuciscus, GÜNTHER, Proc. Zool. Soc. London 1864, 147, San Jose de Nicaragua, Chiapas.

Pristipoma leuciscus, var. *elongatus*, STEINDACHNER, Neue und seltene Fische aus dem k. k. Museum, 30, 52, pl. 9, fig. 2, 1879, Tumbez, west coast of South America; an elongate specimen, probably of the same species.

Pomadasys leuciscus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 387.

Pomadasis elongatus,* JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 352; specimens with slender body and narrow preorbital; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 150; JORDAN & FESLER, *l. c.*, 495.

Pomadasis leuciscus, JORDAN & FESLER, *l. c.*, 495; JORDAN, Fishes of Sinaloa, 462, 1895.

1698. BRACHYDEUTERUS AXILLARIS (Steindachner).

(BURRO BLANCO.)

Head 3⅘; depth 3½; D. XII, 16; A. III, 9; scales 6–50–10. Body rather robust, compressed, the back moderately arched; dorsal fin deeply notched; preopercle with small serræ; suprascapula finely serrate; preorbital broad, about as wide as eye; anal spines small or moderate, the second little, if any, longer or stronger than third, 3½ to 4 in head; anal lower than the soft dorsal; soft dorsal and anal largely covered with small scales; pectoral fin long, nearly equal to head. Color grayish-silvery, with light and dark stripes along rows of scales, these sometimes obscure; fins unspotted; body with faint dark crossbands; back and sides with dark stripes formed by dark spots along the rows of scales; a large inky-black axillary blotch, encroaching on the rays of the pectoral fin, a color mark by which the species may be known at once. Length nearly a foot. Pacific coast of Mexico; not rare, but known only from about Mazatlan and Guaymas. (*axillaris*, from the black axillary spot.)

Pristipoma axillare, STEINDACHNER, Ichth. Notizen, VIII, 7, 1869, Mazatlan.

Pomadasis axillaris, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 151; JORDAN & FESLER, *l. c.*, 494; JORDAN, Fishes of Sinaloa, 462, 1895.

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*The specimens called *elongatus* by Jordan & Gilbert differ somewhat from the *elongatus* of Steindachner. Renewed comparison of many examples leads us to the conclusion that the specimens named *leuciscus* and *elongatus* are simply rather extreme forms of one species.

545. POMADASIS, Lacépède.

(BURROS.)

Pomadasis, LACÉPÈDE, Hist. Nat. Poiss., IV, 516, 1803 (*argenteus*).
Les pristipomes, CUVIER, Règne Animal, Ed. 1, 279, 1817 (*hasta*, etc.).
Pristipoma, Oken, Isis, 1817 (*hasta*).
Pristipoma, CUVIER, Règne Animal, Ed. 2, II, 176, 1829 (*hasta*, etc.).
Rhencus, JORDAN & EVERMANN, Check-List, 387, 1896 (*panamensis*).
Rhonciscus, JORDAN & EVERMANN, Check-List, 387, 1896 (*crocro*).

Body oblong, somewhat compressed, the back not much elevated; mouth rather small, terminal, low, the lips thin; maxillary usually not extending to opposite the eye, its tip not reaching the posterior edge of the broad preorbital; premaxillaries protractile; teeth on jaws only, in villiform bands, subequal, or the outer series in upper jaw more or less enlarged; no red on the jaws; a central groove behind the symphysis of the lower jaw; cheeks and opercles scaly; preopercle rather distinctly serrate, the serræ below not turned forward; suprascapula serrate; scales large, those above lateral line in series parallel with it; no small scales at base of the others; soft dorsal and anal fins naked, or with a very few scales at base; dorsal fin emarginate, the spines strong, 11 to 13 in number, the soft rays 11 to 14; anal fin of 7 or 8 soft rays, short, with the second spine always very strong; gill rakers feeble, few in number; caudal lunate, forked. This genus is composed of small shore fishes, some of its representatives being found in most tropical seas. Several of the species enter fresh waters, and perhaps belong to the brackish-water fauna. Numerous species are found on the west coast of Africa and about the Cape Verde Islands, but so far as known none enters European waters. (*πῶμα*, operculum; *δασύς*, rough, hence more correctly written *Pomadasys*.)

RHENCHUS (ʽρέγκος, or ʽρόγκος, snoring, hence *Ronchus*, *Ronco*, *Roncador*):

- *a.* Teeth in both jaws in villiform bands, the outer series not at all enlarged; preopercle with weak serratures; dorsal spines 12.
  - *b.* Third dorsal spine produced, much longer than the others, about half length of head; second anal spine somewhat shorter; profile convex; scales nearly smooth; pectoral fin very long, as long as head. Color silvery, lower fins white; a distinct dark blotch on opercle and a fainter one on sides below spinous dorsal. Body rather robust. PANAMENSIS, 1699.
- *aa.* Teeth in both jaws in villiform bands, those in the outer series in the upper jaw more or less enlarged; preopercle sharply serrate; caudal fin lunate or truncate, the lobes short.

  PRISTIPOMA (πρίστης, saw; πῶμα, operculum):
  - *c.* Dorsal spines XII; preorbital broad.
    - *d.* Mouth large, maxillary reaching to anterior third of eye, about 2⅔ in head.
      - *e.* Scales rather small, 8–56–20. Body elongate-elliptical, compressed, somewhat elevated at nape; anterior profile straight from nape to end of snout; snout produced, blunt, rounded; dorsal spines low, the longest 2¾ in head; second anal spine very long, 1⅔ in head; pectoral short, not reaching vent. Coloration uniform. BAYANUS, 1700.
      - *ee.* Scales still smaller, 65 in a longitudinal series; body elongate; maxillary extending a little beyond front of eye; anal spines strong, the second three-fourths the depth of body. Color nearly plain; silvery below. PRODUCTUS, 1701.

dd. Mouth small, the maxillary not reaching beyond anterior edge of orbit, about $3\frac{1}{3}$ in head; pectorals long, $1\frac{1}{5}$ in head; scales large, 45 to 48. Body ovate-elongate, compressed, considerably elevated at nape; anterior profile straight or slightly concave from nape to point of snout; snout sharp and pointed.

f. Eye $4\frac{1}{2}$ in head; dorsal fin very deeply notched, the spines long and strong, the longest about 2 in head; second anal spine very long and strong, about 2 in head; pectoral long, reaching a little beyond the vent, about $3\frac{1}{3}$ in body. Coloration dusky, with a metallic luster above, lighter below; back with about 4 dusky transverse bands extending to level of pectoral. MACRACANTHUS, 1702.

ff. Eye $3\frac{1}{2}$ in head; second anal spine more than half head, longer than fourth dorsal spine. ANDREI, 1703.

RHONCISCUS (diminutive of ῥογκός, grunter):

cc. Dorsal spines XIII; preorbital narrow.

g. Body moderately elongate, the depth $2\frac{2}{3}$ to 3 in length.

h. Snout pointed, $3\frac{2}{3}$ in head. Body elongate, compressed, the back elevated, high at the nape, the anterior profile rather irregular, varying with age; a more or less distinct frontal depression above eye in old specimens; mouth small, the maxillary barely extending to the anterior edge of orbit; lower jaw included; scales rather large, 6–54–16, those above the lateral line parallel; dorsal fin moderately notched; second anal spine very strong and long, reaching past tips of all the rays; pectoral short. Color rather plain, about 3 or 4 ill-defined longitudinal dark stripes along sides, one from point of snout to middle of base of caudal. CROCRO, 1704.

hh. Snout longer, moderately pointed, about 3 in head; body elongate, ovate, compressed, the back elevated, depth about 3 in length; pectorals rather long, $1\frac{1}{8}$ in head; anterior profile steep and convex over snout, depressed above eye, becoming slightly convex at nape; top of head with a slight depression; mouth small, the maxillary barely reaching to the anterior edge of eye; preorbital very narrow; eye very large, about 3 in head; soft dorsal and anal slightly scaly at base; dorsal fin only moderately notched, the soft part much shorter and lower than the spinous portion; dorsal spines very high and stout, fourth $1\frac{1}{2}$ in head; second anal spine very long and strong, $1\frac{2}{5}$ in head; pectoral long; caudal slightly lunate. Color uniformly silver-gray, the base of each scale slightly darker. BRANICKI, 1705.

gg. Body very long and low, compressed, the back little elevated, the depth about $3\frac{3}{5}$ in length; pectorals shortish, $1\frac{1}{3}$ in head. Second anal spine very long, $1\frac{1}{4}$ in head; anterior profile irregular, straightish over snout, slightly convex above eye, occiput concave, convex at nape; mouth moderate; maxillary reaching to front of pupil; teeth at angle of preopercle almost spiny; eye large; base of soft dorsal and anal naked or slightly scaly; dorsal fin only slightly notched, the soft part about half as long as spiny portion; dorsal spines very strong; second anal spine very long, reaching beyond tips of last rays. Color of body metallic grayish-golden, with indistinct streaks and bands; belly lighter; fins dusky. RAMOSUS, 1706.

Subgenus RHENCUS, Jordan & Evermann.

1699. POMADASIS PANAMENSIS[*] (Steindachner).

Head 2½ to 2⅔; depth 2⅗ to 2⅘. D. XII, 13. A. III, 8; scales 7–48–12; eye 4 in head; preorbital deep, about as broad as eye; interorbital 4¾; maxillary 3. Body robust, somewhat compressed, the back elevated, the anterior profile convex; mouth rather large, oblique. Teeth in upper jaw in broad villiform bands, the outer teeth not enlarged; lower jaw projecting; preopercle very weakly serrate; suprascapula nearly entire. Third dorsal spine strong, considerably produced, much longer than the fourth, and more than twice length of second, about ½ length of head; second anal spine somewhat shorter, but strong, much larger and longer than third, not reaching tips of last ray when depressed; caudal lunate. Gill rakers short and slender, 6+12; scales nearly smooth; pectoral fin very long, falcate, as long as head. Color grayish-silvery; young with 6 very faint cross shades, one of these below spinous dorsal appearing as a roundish dark spot; lower fins white; a distinct dark blotch on opercle and a fainter one on sides below spinous dorsal. Length 14 inches. Pacific coast of tropical America; a well-marked species, common at both Panama and Mazatlan. (Name from Panama).

Pristipoma panamense, STEINDACHNER, Ichth. Beiträge, III, 8, 1875, Panama.
Pomadasis panamensis, JORDAN & FESLER, *l. c.*, 494.

Subgenus PRISTIPOMA, Cuvier.

1700. POMADASIS BAYANUS, Jordan & Evermann, new species.

Head 2⅕; depth 3½; scales 8–56–20; D. XII, 12; A. III, 7; eye 5 in head; preorbital 6⅓; snout 3¼; maxillary 2⅔; pectoral 5 in body; 4th dorsal spine 2¾; second anal spine 1⅔; soft dorsal 2⅓ in spinous. Body elongate-elliptical, compressed, somewhat elevated at nape; anterior profile straight from nape to end of snout; snout produced, blunt, rounded; preorbital broad, not quite so wide as eye; preopercle and suprascapula coarsely serrated. Mouth rather large, the maxillary reaching to anterior third of eye; teeth in upper jaw in villiform bands, those in front of upper jaw more or less enlarged, acute; dorsal fin deeply notched; dorsal spines low, the longest about 2¾ in head; soft dorsal short, its base contained about 2⅓ times in base of spinous portion; second anal spine very long and strong, about 1⅔ in head; soft dorsal and anal slightly scaly at base; pectoral short, not reaching vent. Coloration uniform olivaceous above, silvery below; fins plain. Pacific coast of Panama, probably always in fresh waters, the known specimens all taken from the Rio Bayano, near Panama. Our type and cotype, 30957, U. S. N. M., two specimens from Rio Bayano, collected by Captain John M. Dow.

Pristipoma humile, KNER & STEINDACHNER, Sitsgber. Akad. Wiss. Münch. 1863, 222, Rio Bayano, near Panama; name preoccupied by *Pristipoma humilis*, BOWDICH, Fishes of Madeira, 236, 1825.
Pomadasis humilis, JORDAN & FESLER, *l. c.*, 492.

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[*] This species is erroneously referred by Jordan & Fesler to the subgenus *Pseudopristipoma*, Sauvage (Bull. Soc. Philom., IV, 220, 1880), of which the type is *Pristipoma leucurum*, Cuvier & Valenciennes, from the Seychelles. *Pseudopristipoma* seems to be a valid genus, closely allied to *Anisotremus*, with which it agrees in form, but with the teeth all small and slender, the outer not at all enlarged.

1701. POMADASIS PRODUCTUS (Poey).

Head 4 in total length with caudal; depth 4⅓; eye 4. D. XII, 12; A. III, 7; scales 65. Body elongate, maxillary extending a little beyond front of eye; anal spines strong, the second ¾ depth of body. Color nearly plain, silvery below. (Poey.) Cuba; not seen by us; apparently closely allied to *P. bayanus*. From *P. ramosus* it differs, if the descriptions can be trusted, in having but 12 dorsal spines. (*productus*, produced, from the long snout.)

Pristipoma productum, POEY, Memorias, II, 186, 1860, Havana.
Pomadasis productus, JORDAN & FESLER, *l. c.*, 493.

1702. POMADASIS MACRACANTHUS (Günther).

(BURRO.)

Head 2⅞; depth 2⅞; scales 6 or 7–48–14; D. XII, 13; A. III, 7; eye 4½ in head; preorbital 4¾; snout 2⅞; maxillary 3⅓; pectoral 3⅓ in body; fourth dorsal spine 2 in head; second anal spine 2; longest dorsal ray 1¼ in longest dorsal spine. Body ovate-elongate, compressed, considerably elevated at nape; anterior profile straight or slightly concave from nape to point of snout; snout sharp and pointed; mouth small, the maxillary not reaching to anterior edge of orbit, about 3⅓ in head; anterior nostril with a flap which extends over posterior nostril; gill rakers about 7+15; scales large; preopercle and suprascapula coarsely serrate; dorsal fin very deeply notched; dorsal spines long and strong, the longest about 2 in head; soft dorsal short, its base contained about 2⅒ times in base of spinous portion; second anal spine very long and strong, about 2 in head; soft dorsal and anal each with a single row of a few scales behind each ray near the base; pectoral long, reaching a little beyond the vent, about 3⅓ in body, 1⅕ in head. Coloration dusky, with a metallic luster above, silvery below; about 4 broad dusky transverse bands extending downward to level of pectoral. Length 15 inches. Pacific coast of tropical America; very common; specimens examined by us from Panama, Mazatlan, Chiapas, and Punta Arenas. It makes a loud snorelike noise when caught, very much like the noise of the "burro" or donkey. (*μακρός*, long; *ἄκανθα*, spine.)

Pristipoma macracanthum, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 146, Chiapas, Mexico.
Pomadasis macracanthus, JORDAN & FESLER, *l. c.*, 493; JORDAN, Fishes of Sinaloa, 461.

1703. POMADASIS ANDREI (Sauvage).

Head 3; depth 3. D. XII, 12; A. III, 7; scales 45; eye equal to snout, 3½ in head; maxillary reaching to opposite front of eye; preopercle with oblique margin. Second anal spine strong, longer than fourth dorsal spine, more than ½ length of head; caudal truncate. Coloration uniform. Near to *P. macracanthus*, but differing in having the eye larger, the snout shorter, in the length of the maxillary and the second anal spine, and in the absence of scales between the rays of the vertical fins. (Sauvage.) Not seen by us; a rather doubtful species. Rio Guayas, Ecuador, near Guayaquil. (Named for its discoverer, M. André.)

Pristipoma andrei, SAUVAGE, Bull. Sci. Philom. Paris, 7th ser., III, 1879, 204, Rio Guayas, Ecuador (Coll. André).

Subgenus RHONCISCUS, Jordan & Evermann.

1704. POMADASIS CROCRO (Cuvier & Valenciennes).

Head 3; depth $2\frac{2}{3}$ to $3\frac{1}{2}$; eye $3\frac{1}{2}$ to 5 in head. D. XIII, 11 or 12; A. III, 6 or 7; scales 6–54–16; preorbital 4 to 8; snout $2\frac{1}{5}$ to $3\frac{2}{3}$; maxillary 3 to 4; pectoral $1\frac{1}{6}$ to $1\frac{1}{2}$; fourth dorsal spine $1\frac{1}{5}$ to $2\frac{1}{4}$; second anal spine $1\frac{1}{2}$ to 2; soft dorsal 2 in spinous. Body elongate, compressed, the back elevated, high at the nape, the anterior profile rather irregular, varying with age; a more or less distinct frontal depression above eye in old specimens; mouth small, the maxillary barely extending to the anterior edge of orbit; lower jaw included; preopercle coarsely serrate, the teeth wide apart; teeth small, the outer scarcely enlarged; scales rather large, those above the lateral line in parallel series; dorsal fin moderately notched; second anal spine very strong and long, reaching past tips of all the rays; pectoral short, caudal slightly lunate. Color rather plain, olivaceous, silvery below, about 3 or 4 ill-defined longitudinal dark stripes along sides, one from point of snout to middle of base of caudal. West Indies, Cuba to Brazil; generally common on sandy coasts. The specimens examined by us are from Cuba (type of *Pristipoma cultriferum* Poey, in the museum at Cambridge), and from São Matheos, Itabapuana, and Cannariveras, in Brazil. (*crocro*, the vernacular name at Martinique.)

Pristipoma crocro, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 264, 1830, Martinique.
Pristipoma cultriferum, Poey, Memorias, II, 185, 1860, Havana. (Type in M. C. Z.)
Pomadasys approximans, Bean & Dresel, Proc. U. S. Nat. Mus. 1884, 160, Jamaica. (Type, No. 30062. Coll. Public Mus. Inst. Jamaica.)
Pomadasis crocro, Jordan & Fesler, *l. c.*, 493.

1705. POMADASIS BRANICKI (Steindachner).

(Burrito.)

Head 3; depth 3. D. XIII or XIV, 12; A. III, 7; scales 7–49–12; eye $3\frac{1}{5}$ in head; preorbital $5\frac{1}{4}$; snout 3; maxillary $3\frac{2}{3}$; pectoral $1\frac{1}{8}$; fourth dorsal spine $1\frac{1}{2}$; second anal spine $1\frac{2}{5}$; soft dorsal $2\frac{3}{4}$ in spinous. Body elongate-ovate, compressed, the back elevated; pectorals rather long, $1\frac{1}{8}$ in head; anterior profile steep and convex over snout, depressed above eye, becoming slightly convex at nape; snout long, moderately pointed; top of head with a slight depression; mouth small, the maxillary barely reaching to the anterior edge of eye; preorbital very narrow; teeth arranged in narrow, thickly set bands, those in front a little broader; preopercle and scapula strongly serrate, the serræ wide apart at angle; gill rakers short and slender, about 6+11; soft dorsal and anal slightly scaly at base; dorsal fin only moderately notched, the soft part much shorter and lower than the spinous portion; dorsal spines very high and stout, the last spine $\frac{1}{4}$ longer than the next to the last; second anal spine very long and strong, reaching past the longest rays, $\frac{1}{3}$ longer than third spine; pectoral long, not reaching past ventrals; caudal slightly lunate. Color uniformly silver-gray, the base of each scale slightly darker. Length 7 inches. Pacific coast of tropical America, Mazatlan to Peru; generally common on the sandy coasts of tropical America on the Pacific side; specimens seen by us from Mazatlan, Panama, Rio Zanatenco, and Chiapas. (A personal name.)

Pristipoma branicki, STEINDACHNER, Denkschr. kaiserl. Akad. Wiss. Wien, XII, 28, 1879, Tumbez, Peru.
Pomadasis branicki, JORDAN & FESLER, *l. c.*, 493; JORDAN, Fishes of Sinaloa, 462, 1895.

1706. POMADASIS RAMOSUS (Poey).

Head 3 to $3\frac{1}{2}$; depth $3\frac{1}{2}$ to $3\frac{3}{4}$. D. XIII, 11 or 12; A. III, 6 or 7; scales 6–54–14; eye $3\frac{1}{2}$ in head; preorbital $5\frac{1}{2}$ to 8; snout $3\frac{2}{5}$; maxillary 3; pectoral $1\frac{1}{3}$; fourth dorsal spine $1\frac{4}{9}$ to 2; second anal spine $1\frac{1}{4}$; soft dorsal 2 in spinous. Body very long and low, compressed, the back little elevated; anterior profile irregular, straightish over snout, slightly convex above eye, occiput concave, convex at nape; mouth moderate, the maxillary reaching to front of pupil; preopercle and scapula very coarsely serrated, those at angle of preopercle almost spiny; eye large; base of soft dorsal and anal naked or slightly scaly; dorsal fin only slightly notched, the soft part about half as long as spiny portion; dorsal spines very strong; second anal spine very long, reaching beyond tips of last rays; pectoral short; caudal truncate. Color metallic grayish-golden, silvery below, with indistinct lengthwise streaks and bands; fins dusky.* Length one foot. West Indies, south to Brazil; not very common. (*ramosus*, branched, the soft rays of the ventrals being much branched.)

Pristipoma ramosum, POEY, Memorias, II, 186, 1860, Havana.
Pristipoma boucardi, STEINDACHNER, Ichth. Notizen, IX, 1, 1869, Gulf of Mexico.
Pomadasis ramosus, JORDAN & FESLER, *l. c.*, 494.

546. ORTHOPRISTIS, Girard.

(PIGFISHES.)

Orthopristis, GIRARD, U. S. Mex. Bound. Survey, Zool., Fishes, 15, 1859 (*duplex* = *chrysopterus*).
Pristocantharus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 256 (*cantharinus*).
Evapristis, JORDAN & EVERMANN, Check-List, 388, 1896 (*lethopristis*).

Body moderately elongate, compressed, the back arched; head compressed, the snout usually long; mouth rather small, placed low; teeth in jaws in villiform bands, the outer teeth above somewhat enlarged; eye moderate; preopercle with its vertical limb straight, finely serrate or entire; gill rakers rather long and slender; dorsal spines rather slender, 12 or 13 in number, the fin usually not much notched; soft dorsal long and low, usually with 15 or 16 rays, the membranes usually naked; anal spines small; caudal lunate. Scales rather small, those above lateral line arranged in series not parallel with it; usually no smaller accessory scales at base of the larger ones. This genus contains a considerable number of species differing from *Pomadasis* in the long anal fin, the smaller scales, and in the less development of the dorsal spines. Nearly all the species are American. (ὀρθός, straight; πρίστις, used for πρίστης, a saw, in reference to the straight, evenly serrated preopercle.)

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* Of this species we have examined a specimen 6 inches long (418, M. C. Z.) from Haiti. A number of specimens in the Museum of Comparative Zoology agree with this one, except that the anal spine is shorter, 2 in head; they are 10615, M. C. Z., São Matheos, the largest a foot in length, and 2421, M. C. Z., from Rio Una. *Pristipoma boucardi*. Steindachner seems to us identical with the specimen from Haiti. It is probable that this is the same as *P. ramosus* Poey, but the description of Poey is not very full.

ORTHOPRISTIS:

a. Soft dorsal and anal scaleless; preopercle more or less serrate behind; mouth small; temporal crest, which arises from behind the eye, very low and inconspicuous, the upper edge below base of the high supraoccipital crest, which originates over the pupil.

b. Scales small, in 80 to 95 series; color plain, depth 3 in length; pectorals 1¼ in head; preorbital rather broad, 3⅔ in head; second anal spine as long as third, 3½ in head. FORBESI, 1707.

bb. Scales larger, in 55 to 65 oblique series; preorbital broad, less than 5 in head; second anal spine about as stout as third, more than 3 in head, not as long as first ray; scales small; anterior profile not concave.

c. Anal III, 10 or 11; snout short and sharp, more than 3 in head; eye large, about 4 in head. Form and general appearance of *O. chrysopterus;* body oblong, compressed, the back elevated, the profile steep and nearly straight, convex at the nape; preopercle finely and sharply serrate; teeth small, outer above a little enlarged.

d. Jaws unequal, the lower included; soft dorsal with 15 rays; scales 8-52-15; pectoral short, 1⅖ in head; each scale with a bronze spot. REDDINGI, 1708.

dd. Jaws subequal; soft dorsal 15 or 16; scales small, 9-58-18; gill rakers very short and small, $x+12$; pectoral falcate, long, equal to head; maxillary scarcely reaching eye. Outline of dorsal straight; spines low and slender; anal spines graduated; caudal moderately forked, upper lobe the longer. Color pale gray; pale chalky-bluish streaks along the edges of the rows of scales; a pale streak below base of dorsal; fins rather pale, the soft dorsal mottled with darker. CHALCEUS, 1709.

cc. Anal III, 12 or 13; snout long and sharp, less than 3 in head; jaws equal; maxillary not reaching to eye; preopercle very slightly serrate above, the serræ blunt, obsolete below; gill rakers short and slender, $x+12$; scales small; the crown, cheeks and pieces of the gill cover covered with small scales; snout in advance of the nostrils; suborbitals and lower jaw naked; dorsal and anal spines inclosed in a deep scaly sheath. Outline of dorsal slightly notched; anal rather high; pectoral shortish; caudal well forked.

e. Second anal spine shorter than third, more than 5 times in head.

f. Body ovate-elliptical, much elevated at shoulders, depth less than 3 in body; scales comparatively small, 10-60-19; rays of soft dorsal 16. Color metallic brownish-olive above, changing to yellowish on belly; indistinct golden streaks along rows of scales; yellowish and bluish blotches on fin membranes. CHRYSOPTERUS, 1710.

ff. Body elongate-elliptical, slightly elevated at shoulders; depth 3¼ in body; scales comparatively large, 8-60-16; dorsal rays 15. Color metallic grayish-blue above, yellowish below; faint lighter streaks following the rows of scales; blotches on the fin membranes. POEYI, 1711.

ee. Second anal spine about as long as third, less than 5 times in head; mouth small, maxillary 4 in head; snout short, 2⅗ in head; spinous dorsal high, 2½ in head. Body oblong, the back elevated; the profile convex at the nape, depressed above eye, thence perfectly straight to the tip of snout. Color brownish-gray above, soiled silvery below; upper parts with 8 diffuse cross bands as wide as the interspaces, extending to below middle of sides; membrane of opercle dark, some dark streaks following rows of scales; dorsal with some dull orange and some pale round spots. CANTHARINUS, 1712.

EVAPRISTIS (εὖ, well; α, without, πρίστης, saw):

aa. Soft dorsal and anal with a row of small scales on the membrane behind each ray. Preopercle entire; preorbital broad, $4\frac{3}{4}$ in head; mouth rather large.

g. Body rather elongate, in form intermediate between *brevipinnis* and *chalceus;* back elevated and compressed, especially anteriorly; profile regularly rounded; maxillary not reaching to opposite front of eye; gill rakers moderate, $x+14$; snout long, moderately sharp; jaws subequal; scales large; some series of scales on soft dorsal and anal, a row close behind each ray. Dorsal fin rather deeply notched; spines low and slender; anal spines graduated; pectoral falcate, rather long; caudal deeply forked Color dark gray, not silvery; center of each scale dark, these spots forming continuous streaks along the rows of scales; those below the lateral line rather less distinct; fins rather dark; opercular membrane and axil dusky. LETHOPRISTIS, 1713.

Subgenus ORTHOPRISTIS, Girard.

1707. ORTHOPRISTIS FORBESI, Jordan & Starks.

Head $3\frac{1}{3}$; depth 3. D. XII or XIII, 15; A. III, 11; scales 9–80 to 85–20; snout $2\frac{3}{7}$; maxillary $3\frac{1}{2}$; orbit $4\frac{1}{8}$; longest dorsal spine $2\frac{4}{5}$; second anal spine $3\frac{1}{2}$; pectoral $1\frac{1}{4}$; ventrals $1\frac{2}{5}$; upper caudal lobe $1\frac{1}{3}$. Body oblong, compressed, the profile gently curved to dorsal. Head moderate, the jaws subequal; teeth small, the outer a little enlarged; maxillary extending to the vertical from posterior nostril; chin with median pit; interorbital convex, its width about equal to orbit; vertical limb of preopercle slightly convex, finely serrated; gill rakers short, about $8+14=22$; preorbital moderate, $3\frac{2}{3}$ in head, 3 in its least width. Snout, maxillary, and lower jaw naked; scales on head small and crowded. Dorsal low, the longest ray about $1\frac{1}{4}$ in the longest spine; second anal spine not longer than third, but slightly stouter, about half as long as longest ray; pectorals moderate, reaching past tips of ventrals, but not to vent; upper lobe of caudal the longer; second anal spine moderate, about as long as third. Color in spirits, dark brown above with bluish reflections; all fins dusky except pectorals; caudal edged with light; membrane of opercle dark; preopercle with some dark spots. Described from two specimens, each about a foot long, from Albemarle Island, one of the Galapagos. (Named for Dr. Stephen Alfred Forbes, of the University of Illinois, in recognition of his work on the *Percidæ.*)

Orthopristis forbesi, JORDAN & STARKS, in GILBERT, Proc. U. S. Nat. Mus. 1896 (1897), 443, Albemarle Island, Galapagos Archipelago. (Type, No. 47574, U. S. N. M. Coll. *Albatross.*)

1708. ORTHOPRISTIS REDDINGI, Jordan & Richardson.

Head $3\frac{1}{6}$; depth 3. D. XII, 15; A. III, 10; scales 8–52–15, 53 pores. Eye $4\frac{1}{4}$ in head; maxillary $3\frac{1}{4}$; preorbital $4\frac{1}{4}$ in snout; pectoral $1\frac{2}{5}$ in head; longest dorsal spine $2\frac{5}{6}$; longest soft ray $3\frac{3}{5}$; second anal spine $4\frac{2}{3}$; ventral $1\frac{2}{3}$; upper caudal lobe $1\frac{1}{2}$; base of soft dorsal in spinous $1\frac{3}{4}$. Body oblong, the back not much elevated; the anterior profile straightish, slightly depressed above the eye; mouth small, low, the maxillary reaching to opposite the nostril; teeth subequal, in broad bands; lower jaw included; nostrils both oblong, the anterior the larger; eye rather large, about as wide as the broad preorbital; preopercle very finely serrated on its posterior margin only, the serrations very weak; gill rakers short and small, about 12; scales moderate, the rows above lateral line very oblique, those below nearly horizontal, the series from the scapular scale reaching middle of spinous dorsal. Spinous dorsal moderate, not deeply notched, the median spines injured in youth in the type specimen; soft dorsal low, free from scales; anal spines low, the second a little longer than third; soft rays scaleless; caudal lunate, the lobes unequal, the upper longer than lower, which is more obtuse; ventrals rather long, inserted just behind axil of pectoral; pectoral rather short, not quite reaching tips of ventrals. Color pearly gray, darker above; each scale of back and sides with a bright bronze spot behind its center, these forming nearly continuous streaks along the rows of scales, running upward and backward anteriorly and nearly horizontally on sides, where they are more or less interrupted or transposed; head plain gray; dorsal with some streaks and clouds; outer fins plain; ventrals somewhat dusky. Gulf of California; one specimen 8¾ inches long from La Paz. This species is very closely allied to the Brazilian species, *Orthopristis ruber* (Cuvier & Valenciennes), but has the body a little more slender and the head larger. (Named in honor of Hon. Benjamin B. Redding, first fish commissioner of California, a man deeply interested in scientific research, to whom Mr. Richardson has been indebted for many favors in his former capacity of superintendent of the California Fish Hatching Station at Sisson.)

Orthopristis reddingi, JORDAN & RICHARDSON in JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 509, pl. 41, La Paz, California. (Type, No. 3458, L. S. Jr. Univ. Mus. Coll. Hopkins expedition to Mazatlan.)

1709. ORTHOPRISTIS CHALCEUS (Günther).

Head 3¼; depth 2⅚. D. XII or XIII, 15 or 16; A. III, 10 or 11; scales 9-58-18; maxillary 3⅓; eye 4⅔ in head; preorbital 4½; pectoral 1¼; snout 2⅔; spinous dorsal 2⅓; second anal spine 4; longest anal ray 2⅔; base soft dorsal in spinous 1¼. Body oblong, compressed, the profile steep and straight, convex at nape. Jaws subequal; teeth small, the outer above a little enlarged; preopercle finely and sharply serrate; gill rakers very short and small, 7+12; pectoral falcate, shorter than head; maxillary scarcely reaching to eye. Outline of dorsal straight, no notch; spines low and slender; soft dorsal low and equal; anal rather higher and shorter, the spines graduated, edge of fin convex; caudal moderately forked, the upper lobe longer. Color paler than in related species; pale chalky bluish streaks along the edges of the rows of scales; a pale streak below base of dorsal; fins rather pale, the soft dorsal mottled with darker; young specimens with the body crossed by broad diffuse dusky cross bands. Length 18 inches. Pacific coast of tropical America, not uncommon, from Cape San Lucas to the Galapagos; specimens examined by us from Mazatlan, Panama, the Gulf of California, and Chatham, Charles, and Albermarle islands, in the Galapagos. (*chalceus*, brassy.)

Pristipoma chalceum, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 146, Panama.
Pristipoma kneri, STEINDACHNER, Ichth. Notizen, VIII, 3, 1869, Mazatlan.
Orthopristis chalceus, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 149; JORDAN & FESLER, *l. c.*, 499; JORDAN, Fishes of Sinaloa, 463, 1895.

1710. ORTHOPRISTIS CHRYSOPTERUS (Linnæus).

(PIGFISH; SAILOR'S CHOICE; HOGFISH.)

Head $3\frac{1}{8}$; depth $2\frac{3}{4}$. D. XII or XIII, 16; A. III, 12 or 13; scales 10–60–19; maxillary $3\frac{1}{3}$; eye 5 in head; preorbital $3\frac{3}{5}$; pectoral $1\frac{1}{4}$; snout $2\frac{2}{5}$; highest dorsal spine $2\frac{7}{8}$; second anal spine $5\frac{1}{2}$; longest anal ray 3; base soft dorsal in spinous $1\frac{1}{4}$. Body ovate-elliptical, somewhat elevated at shoulders, considerably compressed. Snout long and sharp, jaws equal, each with a narrow band of slender teeth, the outer above a little larger; maxillary not reaching to eye; preopercle very slightly serrate above, the serræ blunt, obsolete below; gill rakers short and slender, 7 + 12. The crown, cheeks, and pieces of the gill cover covered with small scales; snout in advance of the nostrils, suborbitals, and lower jaw naked; dorsal and anal spines inclosed in a deep scaly sheath, the soft rays naked. Outline of dorsal very slightly notched; anal rather high, second anal spine shorter than third; pectoral shortish, reaching past tips of ventrals; caudal well forked, the upper lobe the longer. Pyloric cœca 6. Color in life, light blue above, shading gradually into silvery below; preorbital and snout of a clear sky-blue; a dash of blue on each side of upper lip; each scale on body with a blue center, the edge with a bronze spot, these forming on back and sides very distinct orange-brown stripes along the rows of scales, those above the lateral line extending obliquely upward and backward, those below being nearly horizontal; snout with bronze spots; 1 or 2 cross lines connecting front of orbits; 2 or 3 oblique lines on preorbital, besides numerous bronze spots larger than those on the body; preorbital also with dusky shades, one of which extends on upper lip; cheeks and opercles with distinct bronze spots, larger than those on body; inside of mouth pale; inside of gill cavity tinged with golden; dorsal translucent, with about 3 bronze longitudinal shades, composed of spots, those of soft dorsal most distinctly spot-like; edge of fin dusky; caudal plain, yellowish at base, dusky toward the tip; anal whitish, its edge dusky, its base shaded with bronze; pectorals and ventrals yellowish, the latter darker at tip. Fresh specimens show no trace of vertical bands. In examples preserved in alcohol the yellowish and blue markings gradually disappear and dark cross shades become apparent. A specimen 5 years in alcohol shows the following coloration: Silver-gray, with faint streaks along the rows of scales; a distinct narrow dusky band from front of spinous dorsal through base of pectorals; behind this 7 or 8 cloudy, obscure bands, alternately broad and narrow; a horizontal dusky shade behind eye; spinous dorsal with a faint medium pale shade; soft dorsal with 3 rows of faint spots; other fins nearly plain. Length 12 to 15 inches. South Atlantic and Gulf coasts of the United States; a common and valued food-fish, abundant along the sandy shores of the eastern

United States from Long Island to the mouth of the Rio Grande. (χρυσός, gold; πτερόν, fin.)

Perca chrysoptera, LINNÆUS, Syst. Nat., Ed. XII, 485, 1766, Charleston.
Labrus fulvomaculatus, MITCHILL, Trans. Lit. and Phil. Soc. N. Y. 1814, 406, New York.
Pristipoma fasciatum, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 285, 1830, New York; young.
Orthopristis duplex, GIRARD, U. S. Mex. Bound. Survey, Zoöl., Fishes, 15, pl. 9, figs. 1 to 4, 1859, Indianola and Brazos Santiago, Texas. (Coll. Clark and Würdemann.)
Pristipoma fulvomaculatum, GÜNTHER, Cat., I, 301.
Orthopristis chrysopterus, JORDAN & FESLER, *l. c.*, 499.

1711. ORTHOPRISTIS POEYI, Scudder.

Head $3\frac{1}{5}$; depth $3\frac{1}{4}$. D. XII, 15; A. III, 12; scales 8–60–16; maxillary $3\frac{1}{3}$ in head; eye 5; preorbital $3\frac{3}{4}$; pectoral $1\frac{1}{4}$; snout $2\frac{1}{3}$; spinous dorsal 3; second anal spine $5\frac{2}{3}$; longest anal ray 3; base soft dorsal in spinous $1\frac{2}{5}$. Body elongate-elliptical, slightly elevated at shoulders, rather more slender than in *O. chrysopterus;* scales comparatively large. Color metallic-grayish blue above, yellowish below; faint lighter streaks following the rows of scales; blotches on fin membranes. West Indies; not rare at Havana; not seen elsewhere. The species is very close to *Orthopristis chrysopterus*, but the body is more slender and the scales are rather larger. (Named for Professor Felipe Poey, for many years the naturalist of the University of Havana.)

Orthopristis poeyi (SCUDDER MS.) POEY, Synopsis, 312, 1868, Havana.
Orthopristis poeyi, JORDAN & FESLER, *l. c.*, 500.

1712. ORTHOPRISTIS CANTHARINUS (Jenyns).

Head $3\frac{1}{5}$; depth $2\frac{5}{6}$. D. XII or XIII, 15 or 16; A. III, 12; scales 9–60–18; maxillary 4 in head; eye $4\frac{2}{3}$; preorbital 4; pectoral 1; snout $2\frac{3}{5}$; spinous dorsal $2\frac{1}{2}$; second anal spine 4; longest anal ray $2\frac{4}{5}$; base soft dorsal in spinous $1\frac{1}{4}$. Body oblong, the back elevated, less so than in *O. chalceus*, the profile convex at the nape, depressed above eye, thence perfectly straight to tip of snout. Jaws equal, each with a narrow band of slender teeth, the outer above slightly enlarged; snout rather short, sharp; eye small; preorbital broad; maxillary not reaching to eye; preopercle very slightly serrate above, the serræ blunt, obsolete below; gill rakers short and slender, $x+12$. Scales small; the crown, cheeks, and pieces of the gill cover covered with small scales; snout in advance of the nostrils; suborbitals and lower jaw naked; dorsal and anal spines inclosed in a deep scaly sheath. Outline of dorsal slightly notched; anal rather high; pectoral shortish; caudal well forked; second anal spine about as long as third. Color brownish-grayish above, soiled silvery below; upper parts with eight diffuse crossbands, as wide as the inter spaces, extending to below middle of sides; membrane of opercle dark, some dark streaks following rows of scales; dorsal with some dull orange and some pale round spots, as in *Orthopristis chrysopterus*. Length, a foot. Galapagos Islands. The above description from two examples, each about a foot long (4648, M. C. Z.), from the Galapagos Islands. The scanty description of *Hæmulon* *modestum*, said to be rare on the whole coast of Peru, seems to belong to this species. (From *Cantharus* (= *Spondylisoma*), a genus of sparoid fishes, which this species remotely resembles.)

Pristipoma cantharinum, JENYNS, Voyage Beagle, Fishes, 49, 1842, Galapagos Islands. (Coll. Charles Darwin.)
* *Hæmulon modestum*, TSCHUDI, Fauna Peruana, 11, 1844, Peru.
Orthopristis cantharinus, JORDAN & FESLER, *l. c.*, 500.

Subgenus EVAPRISTIS, Jordan & Evermann.

1713. ORTHOPRISTIS LETHOPRISTIS, Jordan & Fesler.

Head $3\frac{1}{4}$; depth 3. D. XII, 14; A. III, 11; scales 8–65–15; maxillary 3 in head; eye $4\frac{3}{4}$; preorbital $3\frac{3}{4}$; pectoral $1\frac{1}{10}$; snout $2\frac{4}{5}$; spinous dorsal $2\frac{4}{5}$; second anal spine $6\frac{1}{2}$; longest anal ray $3\frac{1}{3}$; base soft dorsal in spinous $1\frac{1}{3}$. Body rather elongate, in form intermediate between *Isaciella brevipinnis* and *O. chalceus;* back elevated and compressed, especially anteriorly, profile regularly rounded; mouth larger than in any other species of *Orthopristis;* maxillary shorter than snout; jaws subequal; teeth small, the outer above longer, slender and close set; maxillary not reaching to opposite front of eye; gill rakers of moderate length, a little shorter than pupil, X+14; snout long, moderately sharp; eye moderate; preorbital broad; preopercle strictly entire; series of scales on soft dorsal and anal, a row close behind each ray, as in *Isaciella;* scales of body without accessory scales. Dorsal fin rather deeply notched, spines low and slender; soft dorsal low, highest toward the front; anal long and rather low, with straight free border; anal spines graduated, the third scarcely half height of first ray; pectoral falcate, rather long; caudal deeply forked. Color dark gray, not silvery; center of each scale dark, these spots forming continuous streaks along the rows of scales, those below the lateral line rather less distinct; fins rather dark; opercular membrane and axil dusky. Galapagos Archipelago; known only from the original type (26947, M. C. Z.), 15 inches long, from the Galapagos Islands. (*λήθομαι*, to forget; *πρίστις*, used for *πρίστης*, a saw; in reference to the entire preopercle.)

Orthopristis lethopristis, JORDAN & FESLER, Proc. Ac. Nat. Sci. Phila. 1889, 36, Galapagos Islands; JORDAN & FESLER, *l. c.*, 500.

547. ISACIELLA, Jordan & Fesler.

Isaciella, JORDAN & FESLER, Review of the Sparoid Fishes of America and Europe, 497, 1893 (*brevipinnis*).

This genus is close to *Orthopristis*, from which it differs chiefly in the presence of small accessory scales at the base of the scales of the body. The form is somewhat peculiar, approaching that of *Microlepidotus;* the fins are very low and the soft dorsal and anal are scaly. One species known. (Diminutive of *Isacia*, a related genus which has no groove at the chin; *Isacia* is from the Japanese name Isaki.)

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* Head $3\frac{4}{5}$ in total; depth 4. D. XIII, 16; A. III, 13; maxillary not quite reaching eye; second anal spine longer and thicker than third. Blackish-gray, paler below. Entire coast of Peru. Scarce. Length 11 inches. (*Tschudi.*)

1714. ISACIELLA BREVIPINNIS (Steindachner).

Head 3⅗; depth 3. D. XIII, 16; A. III, 12 or 13; scales 10–65–20; maxillary 3½ in head; eye 4⅓; preorbital 6⅓; pectoral 1; snout 3⅘; spinous dorsal 2½; second anal spine 5⅓; longest anal ray 3¾; base of soft dorsal in base of spinous dorsal 1¼. Preopercle weakly serrate; preorbital very narrow, 6⅓ in head; mouth small, maxillary longer than snout. Body rather fusiform, somewhat compressed, the back elevated, anterior profile steep, convex; mouth with narrow bands of brush-like teeth, the outer above slender, close set and a little enlarged; maxillary reaching to anterior edge of eye; gill rakers short and slender, *x* + 16; snout short, blunt; eye large; lower jaw included. Scales small, extending from preorbital to fork of caudal, covering bases of pectorals, ventrals, soft dorsal, and anal; base of each scale at base of trunk and posterior part of head covered with minute accessory scales; a series of small scales on the membrane behind each ray; dorsal and anal fins in a low scaly sheath; dorsal fin slightly notched, last spine 1⅛ in first soft ray; spinous dorsal low, spines slender; soft dorsal and anal very low, third anal spine longest; pectoral sharp, falcate, as long as head; caudal long, deeply forked. Color light bluish-gray, with brownish-gray stripes following the rows of scales. Pacific coast of Mexico; rather rare. This species and the preceding form a transition from *Microlepidotus* to typical *Orthopristis.* (*brevis,* short; *pinna,* fin, from the low dorsal and anal.)

Pristipoma brevipinne, STEINDACHNER, Ichth. Notizen, VIII, 10, 1869, Mazatlan.
Orthopristis brevipinnis, JORDAN & FESLER, *l. c.*, 500; JORDAN, Fishes of Sinaloa, 463, 1895.

548. MICROLEPIDOTUS, Gill.

Microlepidotus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 256 (*inornatus*).

This genus is near *Orthopristis,* differing chiefly in the elongate form, very small scales, increased number (14) of dorsal spines, and deeply notched fins, the dorsal and anal being scaleless. The skull is very broad and rounded, the interorbital width greater than length of snout; the temporal crest rises above the pupil and is high, more than half the height of the supraoccipital crest, which rises above front of pupil. One species known. (*μιϰρος,* small; *λεπῐδωτός,* scaled).

1715. MICROLEPIDOTUS INORNATUS, Gill.

(JOPATON.)

Head 3½; depth 3¼. D. XIV, 15; A. III, 12; scales 9–80–20; maxillary 3¼ in head; eye 4¾; preorbital 7½; pectoral 1⅒; snout 3⅓; spinous dorsal 2⅓; second anal spine 6; longest anal ray 3¾; base soft dorsal in spinous 1½. Body elliptical elongate, slightly compressed, the back moderately elevated, profile convex from nape to snout; mouth large, with numerous bristly teeth, curved inward, larger in front; maxillary reaching to anterior edge of eye; interorbital space very broad; preorbital very narrow; jaws subequal; preopercle sharply serrate; gill rakers short, 8 + 17; snout bluntish, equal to maxillary; eye very large. Scales very small, extending from nostril to fork of caudal, covering base of pectoral and ventrals; dorsal and anal fins included in a deep, scaly sheath which runs out to the tips of last rays; scales on dorsal and anal rays only visible by the aid of a lens; scales of body without accessory scales. Dorsal fin deeply notched, last spine 1½ in first ray; spinous dorsal high, spines slender; soft dorsal very low and long; anal slightly higher than soft dorsal, second spine longest; pectoral sharp, falcate; caudal sharp. Color bluish-gray, with lighter longitudinal streaks of bright bronze; upper fins with golden; caudal partly dusky; preorbital with vertically oblong spots. Length 18 inches. Gulf of California, rather rare, about rocky islands; specimens examined by us from Cape San Lucas, Guaymas, La Paz, and Mazatlan. (*inornatus*, not adorned.)

Microlepidotus inornatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 256, Cape San Lucas (Coll. Xantus); JORDAN, Fishes of Sinaloa, 463, 1895.

Orthopristis inornatus, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 148; JORDAN & FESLER, *l. c.*, 501.

549. GENYATREMUS, Gill.

Genyatremus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 256 (*cavifrons*).

This genus resembles *Anisotremus* in most external respects, but there is no central pore or groove at the chin. In this respect it agrees with *Plectorhynchus*, *Parapristipoma*, and *Isacia*, groups not represented within our limits; the species without this groove belonging chiefly to the Old World. One species known, a robust fish with strong spines and a convex profile; soft dorsal and anal scaleless. (*γένυς*, chin; *ἀ*, privative; *τρῆμα*, aperture.)

1716. GENYATREMUS LUTEUS (Bloch).

Head 3⅖; depth 2¼. D. XIII, 12; A. III, 11; scales 11–52–19. Body ovate, compressed, the back much elevated, the depth a little less than half body; anterior profile evenly convex at nape, gradually becoming concave to front of eye, where it rapidly descends straightish to point of snout; interorbital area flat, about equal to eye; occipital crest arising opposite middle of pupil, its base rising on the highly arched frontals considerably above top of the low temporal crest. Head small; snout blunt and short; mouth moderate, the maxillary reaching past anterior edge of orbit; anterior nostril oblong, much larger than posterior; preorbital very narrow, about ¼ as wide as eye; eye large, 3 in head; preopercle strongly serrate on angle, the serræ gradually becoming weaker on both limbs; gill rakers weak, about 7 below angle, besides rudiments. Dorsal fin high, the fifth spine longest, the last spine slightly longer than the preceding one and about ⅔ as long as the first ray; anal fin lower than soft dorsal, the second spine longer and stronger than third; pectorals short; caudal subtruncate. Scales small, not parallel with lateral line, arranged obliquely above and horizontally below, largest below the lateral line; vertical fins scaleless; scapular scale very evident, about three times as long as broad; lateral line not following outline of back, wavy below the soft dorsal. Color in spirits uniform golden, with numerous longitudinal stripes of a brighter color following the rows of scales below the lateral line. Lesser Antilles to Brazil; not rare on sandy coasts. It has not been found in Cuba. (*luteus*, yellow.)

Lutianus luteus, BLOCH, Ichthyologia, pl. 247, 1793, Martinique; on a drawing by PLUMIER.

Grammistes hepatus, BLOCH & SCHNEIDER, Syst. Ichth., 187, 1801; after BLOCH.

Diagramma cavifrons, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 290, pl. 123, 1830, Rio Janeiro.

? *Pristipoma serrula*, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 272, Martinique.

? *Pristipoma auratum*, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 272, Martinique.

Genyatremus luteus, JORDAN & FESLER, *l. c.*, 504.

Family CLI. SPARIDÆ.

(THE PORGIES.)

Body oblong, or more or less elevated, covered with rather large, adherent scales, which are never truly ctenoid. Lateral line well developed, concurrent with the back, not extending on caudal fin. Head large, the crests on the skull usually largely developed. No suborbital stay. Mouth small, terminal, low, and horizontal. Premaxillaries little protractile; maxillary short, peculiar in form and in articulation, without supplemental bone, for most of its length slipping under the edge of the preorbital, which forms a more or less distinct sheath; preorbital usually broad; teeth strong, those in front of jaws conical, incisior-like or molar; lateral teeth of jaws always blunt and molar; no teeth on vomer or palatines; posterior nostril largest, usually more or less oblong or slit-like; lower pharyngeals separate; gills 4, a large slit behind the fourth; pseudobranchiæ large; gill rakers moderate; gill membranes separate, free from the isthmus; preopercle entire or serrulate; opercle without spines; sides of head usually scaly; dorsal fin single, continuous, or deeply notched, the spines usually strong, depressible in a groove; spines heteracanthous, that is, alternating, the one stronger on the right side, the other on the left, the spines 10 to 13 in number; anal fin rather short, similar to the soft dorsal, and with 3 spines; ventral fins thoracic, the rays I, 5, with a more or less distinct scale-like appendage at base; caudal fin usually more or less concave behind; air bladder present, usually simple; pyloric cœca few; vertebræ usually 10 + 14 = 24; intestinal canal short. Carnivorous shore fishes of the tropical seas, especially abundant in the Mediterranean, Red Sea, and West Indies. Genera about 12, species about 90, most of them much valued as food. (*Sparidæ*, *Sargina*, and *Pagrina*, Günther, Cat. Fishes, I, 437–483.)

SPARINÆ:

- *a.* Teeth in front of jaws conical or incisior-like, not molar; dorsal fin continuous; posterior nostril oblong; preopercle entire.
  - *b.* Second interhæmal bone enlarged, hollowed anteriorly, or pen-shaped, receiving the posterior end of the air bladder in its anterior groove; posterior nostril slit-like; cheeks scaly.
    - *c.* Front teeth narrow, compressed, forming lanceolate incisors; the first spine bearing interneural with an antrorse spine; temporal crest obsolete;

lateral crest nowhere coalescing with the supraoccipital crest; interorbital area flattish, with two low ridges; a small foramen in each of these above front of pupil; interorbital area much contracted anteriorly; a strongly projecting prefrontal process, which makes an acute angle with the supraorbital.

d. Frontal bones partly porous and gibbous; antrorse dorsal spine attached directly to the interneural; (third dorsal spine very long, longer than head). Otrynter, 550.

dd. Frontal bones not gibbous nor porous; antrorse dorsal spine attached to the interneural by a long process or spur; (third dorsal spine about half head). Stenotomus, 551.

cc. Front teeth conical or canine-like; first spine-bearing interneural without antrorse spine; temporal crest very thin and high, joining the lateral crest which forms part of the margin of orbit above middle of eye, both crests coalescing with the supraoccipital in the cavernous anterior part of the interorbital area; interorbital area somewhat contracted anteriorly; prefrontal process very strong, making an obtuse angle with the supraorbital, this process forming a conspicuous knob above the long posterior nostril. Calamus, 552.

bb. Second interhæmal spine normal, not "pen-shaped;" cheeks scaly.

e. Front teeth conic, not compressed; no incisors; occipital crest coalescent with the temporal crests; no antrorse spine on first interneural; dorsal spines usually 11 to 13.

f. Anterior teeth in both jaws strong, decidedly canine-like; body more or less deep and compressed. Sparus, 553.

ee. Front teeth incisor-like; no canines.

g. Incisors broad; molars in 2 to 4 series in each jaw.

h. First spine-bearing interneural with an antrorse spine in front.

i. Supraoccipital and temporal crests nowhere coalescent, the interorbital area not swollen; frontal bone in the interorbital area thin, concave in transverse section; temporal crest low, separated from supraoccipital crest by a flattish area which extends forward on each side of supraoccipital crest and to groove of premaxillary spines. (Incisors conspicuously notched.) Lagodon, 554.

ii. Supraoccipital and temporal crests coalescent anteriorly, both disappearing in the gibbous interorbital area; frontal bone between eyes transversely convex and more or less honeycombed; temporal crest separated from occipital crest by an excavated area bounded anteriorly by the lateral crest, which merges into the supraoccipital above the eye. (Incisors entire or with a shallow notch.) Archosargus, 555.

hh. First spine-bearing interneural without antrorse spine above; skull essentially as in *Archosargus*, the frontal bone more cavernous. Diplodus, 556.

550. OTRYNTER, Jordan & Evermann.

(Deep-Water Porgies.)

Otrynter, Jordan & Evermann, Check-List, 388, 1896 (*caprinus*).

This genus is allied to *Calamus* and *Stenotomus*, differing from the former in its incisor-like front teeth, and from the latter in the structure of the skull. Temporal crest rudimentary, persisting in a swelling of the basal portion of the supraoccipital. Supraoccipital crest making a sharp angle over the eye, with a porous, gibbous portion of the frontal bones. Interhæmal spine having the peculiar structure seen in *Calamus*. Antrorse spine before dorsal attached directly to the fourth interneural, no downward process being evident. One species, found in rather deep water. (*ὀτρυντήρ*, one who stirs up or whips, from *ὀτρύνω*, to stir; from the long spine.)

1717. OTRYNTER CAPRINUS (Bean).

Head $3\frac{1}{6}$; depth 2. D. XII, 12; A. III, 12; scales 5–50–15. Body subovate, the back anteriorly much elevated, the depth about half the length to base of caudal; anterior profile steep and straightish, convex on nape and above eye; temporal crest rudimentary, persisting in a swelling on the basal portion of the supraoccipital bone; supraoccipital crest making a sharp angle over eye with a porous, gibbous portion of the frontal bones; snout short, about 2 in head; eye large, a little less than width of preorbital, about $3\frac{1}{2}$ in head; anterior teeth of jaws small, in close-set band, the outer series a little enlarged, compressed, and lanceolate, much as in *Stenotomus chrysops;* molars in two rows; dorsal spines very broad and flat; scales on the anterior part of body much enlarged; anterior row of scales on cheek much enlarged, extending to level of pupil, about 12 scales in the first series; scaly sheath at base of soft dorsal and anal very conspicuous; pectoral a little longer than head, $2\frac{3}{5}$ in body; caudal fin little forked, the middle ray about $1\frac{7}{8}$ in longest ray. First and second dorsal spines very short, their length about 3 in eye; third, fourth, and fifth more or less filamentous, the third longer than head. Frontal bones gibbous and porous; antrorse spine attached directly to the interneural, no downward projecting part evident. Color light olive; silvery below; the young with faint, very narrow darker bars. Deep waters off the west coast of Florida; as yet known only from numerous examples taken from the stomachs of snappers (*Neomænis*) and groupers (*Epinephelus*) on the Florida snapper banks. (*caprinus*, like a goat, the species having been sent in under the name "goat-head porgy," which was a misunderstanding of the name "jolt-head porgy," which is *Calamus bajonado.*)

Stenotomus caprinus, BEAN, Proc. U. S. Nat. Mus. 1882, 426, Snapper Banks off Pensacola (Type, No. 30795. Coll. Silas Stearns); JORDAN & FESLER, *l. c.*, 507.
Argyrops caprinus, JORDAN & GILBERT, Synopsis, 929.

551. STENOTOMUS, Gill.

Stenotomus, GILL, Canadian Naturalist, August, 1865 (*argyrops*).

This genus is close to *Calamus*, having the same quill-like interhæmal bones, the flattened incisors and antrorse dorsal spine mainly distinguishing it; temporal crest obsolete; frontal bones not gibbous nor porous; antrorse spine attached to the fourth interneural by a downward-projecting spine about thrice as long as the spine; lateral crest nowhere coalescing with the supraoccipital crest; interorbital area flattish, with two low ridges, a small foramen in each of these above front of pupil; interorbital area much contracted anteriorly; a strongly projecting prefrontal process, which makes an acute angle with the supraorbital. American shore fishes. (*στενός*, narrow; *τομός*, cutting; from the narrow incisors.)

a. Body ovate, elliptical, the depth about the same from the first dorsal spine to the eleventh; anterior profile steep; pectoral shorter than head, $3\frac{1}{2}$ in body; snout short, $2\frac{1}{2}$ in head. CHRYSOPS, 1718.

aa. Body elongate, ovate, the depth decreasing backward from the first dorsal spine; anterior profile not steep; pectoral about as long as head, $3\frac{1}{5}$ in body; snout long, half head. ACULEATUS, 1719.

1718. STENOTOMUS CHRYSOPS (Linnæus).

(COMMON SCUP; PORGY; SCUPPAUG.)

Head $3\frac{1}{2}$; depth $2\frac{1}{10}$. D. XII, 12; A. III, 11; scales 8–50–16; snout short, $2\frac{1}{2}$ in head; eye small, narrower than the preorbital, 4 to $4\frac{1}{4}$ in head; fourth dorsal spine 2, third anal spine the longest, 3. Body ovate-elliptical, the depth about the same from the first dorsal spine to the eleventh; anterior profile steep, nape convex, a strong depression above and in front of eye, straightish over snout; pectoral less than head, about $3\frac{1}{2}$ in body, extending to first anal spine; a scaly sheath very conspicuous at base of soft dorsal and anal fins; temporal crest obsolete; supraoccipital crest continuous with the frontal bones; incisor teeth very narrow, almost conical in appearance; molars in 2 rows above; gill rakers small, about $6+10$; top of head, snout, orbitals, and chin naked; scales on cheek extending from upper margin of eye, the anterior row composed of from 15 to 20 scales; caudal fin forked, the middle ray about $2\frac{1}{3}$ in longest ray. Color brownish, somewhat silvery below, everywhere with bright reflections, but without distinct markings in the adult; soft parts of vertical fins mottled with dark in adult; young faintly barred; axil dusky. Length about a foot. Atlantic coast of the United States from Cape Cod to South Carolina; one of the commonest food-fishes of our Atlantic coast, especially abundant northward. (*χρυσός*, gold; *ὤψ*, eye.)

Sparus chrysops, LINNÆUS, Syst. Nat., Ed. XII, 471, 1766, Charleston.
Sparus argyrops, LINNÆUS, Syst. Nat., Ed. XII, 471, 1766, Charleston; young.
Sparus xanthurus, LACÉPÈDE, Hist. Nat. Poiss., IV, 120, 1803, Charleston; after *argyrops*.
Labrus versicolor, MITCHILL, Trans. Lit. & Phil. Soc., I, 1815, 464, New York.
Sargus ambassis, GÜNTHER, Cat., I, 449, 1859, New York.
Stenotomus chrysops, JORDAN & GILBERT, Synopsis, 556; JORDAN & FESLER, *l. c.*, 507.

1719. STENOTOMUS ACULEATUS (Cuvier & Valenciennes).

(SOUTHERN PORGY.)

Head 3; depth $2\frac{1}{5}$. D. XII, 12; A. III, 11; scales 8–54–15. Body elongate-ovate, the depth gradually decreasing from first dorsal spine to caudal peduncle; anterior profile not steep, nape slightly convex, a slight depression above and behind eye, convex over snout; pectoral about as long as head, $3\frac{1}{5}$ in body; scaly sheath at base of soft dorsal and anal inconspicuous; snout long and pointed, 2 in head; eye large, less than width of preorbital, about $3\frac{3}{4}$ in head; interorbital area very convex; 6 strong conical teeth in front of upper jaw and 8 in lower; molar teeth coarser and larger than in *S. chrysops;* scales on cheek reaching to top of eye, the upper rows less distinct than the lower, the anterior row of about 20 scales; caudal fin moderately forked, the middle ray about 2¼ in longest ray. First dorsal spine as long as eye, the second about as long as third, which is about 2 in head; temporal crest obsolete; frontal bones not gibbous or porous; antrorse spine attached to the fourth interneural by a downward projecting spur about twice as long as the spine. Color nearly plain dull silvery, with golden longitudinal streaks, following the rows of scales; axil dusky; ventrals dark. South Atlantic and Gulf coasts of the United States, from Cape Hatteras to Texas, common. It closely resembles the northern scup, which it more or less replaces southward. The specimens here described from Charleston. (*aculeatus*, spined.)

Chrysophrys aculeatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 137, 1830, Charleston.
Stenotomus aculeatus, JORDAN & GILBERT, Synopsis, 557; JORDAN & FESLER, *l. c.*, 507.

552. CALAMUS, Swainson.

(PEZ DE PLUMA.)

Calamus, SWAINSON, Nat. Hist. Fishes, etc., II, 222, 1839 (*calamus*).
Grammateus, POEY, Ann. Lyc. Nat. Hist. N. Y. 1872, 182 (*microps*).

Body oblong, compressed, the back elevated; head large, the preorbital deep; mouth small, the teeth strong, those in front conical or pointed, those on sides molar; preopercle entire, posterior nostril slit-like; dorsal fin rather low, not much notched, the soft rays low, not scaly; caudal well forked; anal spines small; pectoral rather long. Second interhæmal bone enlarged, hollowed anteriorly, or pen-shaped, receiving the posterior end of the air bladder in its anterior groove; first spine-bearing interneural without antrorse spine; temporal crest very thin and high, joining the lateral crest which forms part of the margin of orbit above middle of eye, both crests coalescing with the supraoccipital in the cavernous anterior part of the interorbital area; interorbital area somewhat contracted anteriorly; prefrontal process very strong, making an obtuse angle with the supraorbital, this process forming a conspicuous knob above the long posterior nostril. Shore fishes, remarkably distinguished by the structure of the interhæmal. This genus contains numerous species, all American, and all very closely related. All are valued as food-fishes. (*calamus*, a quill or reed, from the quill-like interhæmal.)

CALAMUS:

- *a.* Scales comparatively small, 8 or 9–54 to 58–18 or 19;* about 6 vertical rows of scales on base of preopercle, with about 12 scales entering into the formation of the lower margin; species of large size, with the preorbital deep, the pectoral fin long, and the outer teeth strong.
  - *b.* Body very deep, the back elevated, the depth in adult half the length to base of caudal; outer teeth about $\frac{10-12}{12-10}$ in number, the outer one on each side in one or both jaws sometimes enlarged, canine-like, sometimes directed forwards, especially in the adult.

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* Scales above the lateral line are counted from the base of the first dorsal spine, those below the lateral line from the base of the first anal spine.

c. Preorbital with reticulations of the bluish ground color around bronze spots; canines of upper jaw usually vertical, but sometimes, especially in old examples, directed more or less horizontally forward; body deeper than in other species, depth $1\frac{9}{10}$ to $2\frac{1}{4}$ in length; anterior profile not very steep, slightly curved; depth of preorbital less than half head; eye large, dorsal spines strong, the longest $2\frac{1}{5}$ to $2\frac{1}{3}$ in head; pectorals a little more than $\frac{1}{3}$ body. Color silvery, the base and center of each scale golden, the edge bluish, these colors forming distinct streaks; a deep violet streak below eye, not extending on eye or opercle; preorbital dull violet, this color forming reticulations around brassy spots. CALAMUS, 1720.

cc. Preorbital region, snout, cheek, and opercles brassy, crossed by horizontal, wavy, nonreticulating lines of violet blue, brightest on preorbital and snout; a sky-blue blotch behind eye over the opercle, extending a short distance on body; outer canines of upper jaw directed horizontally forward, except in the very young, these teeth longer than in *C. calamus;* anterior profile nearly straight and very steep to the nape, then strongly convex. Color silvery, each scale with a violet spot above and orange spots below; sides with dark crossbands in life, which disappear at death. PRORIDENS, 1721.

bb. Body more elongate, the depth $2\frac{1}{6}$ to $2\frac{3}{4}$ in length.

d. Upper jaw with a strong antrorse canine on each side, as in *C. proridens;* preorbital with blue, wavy stripes; preorbital deep; dorsal high; pectoral reaching front of anal; cheeks with blue flexuous lines, anastomosing and forming rivulations; spinous dorsal edged with black. PENNATULA, 1722.

dd. Upper jaw without antrorse canines, the anterior teeth strong, $\frac{4\text{–}6}{6\text{–}8}$, one on each side of upper jaw more or less enlarged; body rather oblong, the snout long and pointed, the anterior profile forming a nearly even curve to front of dorsal. Color dull brassy with little blue; a faint blue stripe below eye; preorbital dull coppery, usually plain, sometimes faintly veined with bluish. Young as in other species, with dark crossbands. BAJONADO, 1723.

GRAMMATEUS (γραμματεύς, a quill pen or instrument for writing):

aa. Scales comparatively large, 6 or 7-45 to 52-13 or 14; about 5 vertical rows of scales on base of preopercle with about 9 scales entering into the formation of the lower margin; no antrorse canines.

e. Pectoral fins long, about 3 in body.

f. Scales of moderate size, 50 to 52 in the lateral line. Body very deep, the back elevated, depth about $2\frac{1}{5}$ to base of caudal; longest dorsal spine about half head.

g. Canines short and strong, about $\frac{6\text{–}8}{6\text{–}8}$; preorbital narrow, its least width $2\frac{1}{2}$ to $2\frac{3}{4}$ in head; snout short. Body much compressed, the back considerably elevated, the anterior profile steep and regularly convex from base of first dorsal spine to point of snout. Color brassy olive, with darker crossbands and few violet marks; preorbital plain brownish; an inky axillary spot. BRACHYSOMUS, 1724.

gg. Canines moderate, about $\frac{8\text{–}10}{10}$; preorbital broad, its least width about $2\frac{1}{4}$ in head. Body moderately compressed, rather elongate, the back only moderately elevated, the anterior profile convex to eye, thence straight to point of snout. Color smutty silvery, with dark crossbands; blotches on fins; no black axillary spot. LEUCOSTEUS, 1725.

ff. Scales large, about 46 (45 to 48) in lateral line; body rather elongate, the depth about 2¼ in body; longest dorsal spine about 2½ in head.

h. Canines small, about $\frac{10}{12}$; eye large, 3 in head; dorsal spines XI; preorbital narrow, about equal to eye. Dorsal outline forming a comparatively regular arch, the back being elevated, the anterior profile steep and nearly straight. Color plumbeous gray, with a blue spot on each scale, preorbital with blue streaks; a blue streak below eye; a blue point in the axil. MACROPS, 1726.

hh. Canines moderate, $\frac{8}{10}$, the outer on each side sometimes enlarged; eye rather small, about 4⅓ in head in adult; preorbital very deep; dorsal spines XII. Body rather oblong, the back not strongly arched, the anterior profile rather evenly curved. Color dull silvery, faintly banded; preorbital plain; axil dusky. TAURINUS, 1727.

ee. Pectoral fin short, about 3½ in body.

i. Dorsal outline forming a comparatively regular arch, the anterior profile from the snout to base of the spinous dorsal evenly convex; the back elevated, the depth in the adult about 2⅙ in length; canines subequal, $\frac{8}{10}$; preorbital not very deep; pectoral shortish. Color dull silvery, with pearly spots on scales of back; preorbital bluish, plain or with pearly markings, without blue stripes; a faint pale streak below eye; axil with a small inky black spot; crossbars on body usually persistent. PENNA, 1728.

ii. Dorsal outline not forming a regular arch, the anterior profile straight from base of spinous dorsal to nape, where a rather sharp angle is formed, thence straightish above eye, the snout convex; body rather elongate, the depth about 2½ in length.

j. Preorbital deep, nearly twice diameter of eye; canine teeth $\frac{8}{10}$. Body oblong, the back little elevated, the anterior profile unevenly curved, very convex before eye. Color olivaceous, with dark bars or spots, the centers of many scales pearly; 6 yellowish spots along the lateral line; preorbital brownish, usually with dashes of golden yellow; membrane of opercle orange; fins mostly barred or spotted. ARCTIFRONS, 1729.

jj. Preorbital not deep, pectoral short, 1⅕ in head; dorsal fins low, the longest spine about 3 in head; canines $\frac{8}{8}$, moderate, equal. Body little elevated, the anterior profile rather strongly convex, the curve continuous from snout to middle of dorsal. Color olivaceous, with darker crossbands; preorbital plain; a dark axillary spot; a blue subocular band. MEDIUS, 1730.

Subgenus CALAMUS.

1720. CALAMUS CALAMUS (Cuvier & Valenciennes).

(SAUCER-EYE PORGY; PEZ DE PLUMA.)

Head 3⅓; depth $1\frac{9}{10}$ to 2¼ (2¾ in total). Eye large, 3¾ in head in adults (12 inches long). D. XII, 12 (XIII, 11); A. III, 10, or III, 11. Scales 9-54-16, cheeks with 5 or 6 series of scales. Body elevated more than in any other known species of this genus, the depth in adult being slighty more than ½ length of body. Anterior profile less steep than in *C. proridens,* the outline of snout being slightly curved; in adults the antedorsal region is very sharply compressed and somewhat gibbous, forming above eye an angle with rest of profile. Greatest depth of preorbital more than ½ head in adult. Mouth small, the maxillary scarcely reaching vertical from front of eye, 2⅔ in head. Outer teeth strong, about 10 to 12 in number, the outer one on each side in one or both jaws sometimes enlarged, canine-like, but sometimes, especially in old examples, directed more or less horizontally forward. Gill rakers small, about 4 + 6. Dorsal spines stronger and lower than in *C. proridens*, the longest 2⅓ in head; pectorals reaching slightly beyond vertical from front of anal, rather more than ⅓ length of body; ventrals 4½ in length; anal spines robust. Color in life, silvery with bluish reflections; the base and central portions of each scale golden, forming distinct longitudinal stripes, the stripes between these pearly or bluish; rows of scales on cheeks and opercles with the pearly stripe median, the golden marginal; a deep violet streak below orbit, not extending forward on snout nor backward on opercles; preorbital deep dull violet like the snout, the ground color forming reticulations around conspicuous round brassy spots which cover half the surface; naked part of the preopercle sometimes similarly marked, more often colored like the body; edge of opercle gilt; lower jaw dusky violet; axil golden; base of pectoral above with a violet bar; fins all pale, vaguely blotched with dull orange; ventrals more or less dusky on inner rays; commissure of lips yellow; iris golden. Length 15 inches. West Indies, north to Florida Keys; generally common about Key West and Havana, less abundant than *proridens* or *bajonado*.* (*calamus*, a reed, the equivalent of *pez de pluma*.)

Pagellus calamus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 206, pl. 152, 1830, Martinique; San Domingo.

Calamus megacephalus, SWAINSON, Nat. Hist. Fish., II, 222, 1839; after CUVIER & VALENCIENNES.

Pagellus orbitarius, POEY, Memorias, II, 201, 1860, Havana.

Calamus macrops, JORDAN & GILBERT, Synopsis, 927, 1883, Garden Key, Florida.

Chrysophrys calamus, GÜNTHER, Cat., I, 487, 1859; several species confounded.

Sparus orbitarius, POEY, Synopsis, 308, 1868.

Calamus calamus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 17; JORDAN & FESLER, *l. c.*, 511.

1721. CALAMUS PRORIDENS, Jordan & Gilbert.

(LITTLE-HEAD PORGY; PEZ DE PLUMA.)

Head 3¼ to 3½ in length (4¼ in total); depth 2 to 2⅓ (2⅔ to 3); eye moderate, 4 in head in adult (11 inches long), 3 in head in young of 6 inches. D. XII, 12; A. III, 10. Scales 9–58–16. Body much elevated, more so than in any other known species except in *C. calamus*. In adults the anterior profile rises in a straight line very steeply to the nape, thence in a gentle curve to front of dorsal. In the young the profile rises less rapidly and is convex;

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*Among the specimens in the museum at Cambridge are some of the types of *Calamus orbitarius*. In some of these none of the canines is turned forward, and none of the specimens collected by Dr. Jordan at Key West and Havana shows this character. In others, however, the outermost of the 7 or 8 canines in the upper jaw is turned directly forward, as in *C. proridens*. Some of these also show an approximation to the head coloration of *C. proridens*. The dorsal spines and the depth of the preorbital show that all these belong to *C. calamus*.

greatest depth of preorbital slightly more than ½ length of head in adult. Mouth not large, the maxillary scarcely reaching vertical from front of orbit, ⅖ length of head. Anterior teeth of outer series slightly longer and more robust than those of the cardiform band; in the upper jaw on each side 1 of these outer teeth becomes much enlarged, canine-like, directed obliquely forward and downward, and strongly curved, the upper surface concave; there are usually 7 teeth of the outer series between these two canines; no evident accessory series of molars. Gill rakers short and blunt, about 4 + 6. Scales on top of head ending abruptly above eye; snout, interorbital, preorbital, suborbital, chin, and edge of preopercle, naked; a triangular patch of scales on cheek, arranged in 7 or 8 series. Dorsal spines slender and high, the longest ½ head; pectorals reaching vertical from origin of anal fin, ⅓ length of body; ventrals 5 in length; upper lobe of caudal as long as head, slightly longer than lower lobe. Color in life, silvery, with bright reflections above, much more brightly colored than in other species; each scale above middle of sides with a spot of rich violet-blue on its basal portion, these forming distinct longitudinal streaks along the rows of scales; on lower part of body these blue spots are replaced by pale orange spots, faint in the young, very distinct in adults. In life the sides have dark bands, which disappear after death; a diffuse, ill-defined horizontal violet-blue area above opercle extending back on to the shoulder; a well-defined horizontal deep-blue stripe below eye; another, somewhat less distinct, above orbit; preorbital region, snout, cheeks, and opercles brassy or bronze, crossed with horizontal, wavy, nonreticulating lines of violet blue, these colors more marked on preorbital and snout; the streak crossing snout above nostrils wider and rather more conspicuous than the others; dorsal marked with orange and very bright violet, its margin always orange, more or less bright in life; caudal banded with dull orange; anal distinctly blue shaded; ventrals not dark, with more or less light yellow; axil slightly dusky; iris dark, with gilt ring. West Indies, north to Florida Keys; the most brightly colored of the genus, very abundant about the Florida Keys. It is not quite so common either at Key West or at Havana as *Calamus bajonado,* but in both places either species far outnumbers all the remaining species combined. (*prora*, prow; *dens*, tooth, from the projecting canines.)

Calamus megacephalus, JORDAN & GILBERT, Synopsis, 926, 1883; not of SWAINSON.
Calamus pennatula, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 15; not of GUICHENOT.
Calamus proridens, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 150, Key West; JORDAN & FESLER, *l. c.*, 511.

1722. CALAMUS PENNATULA, Guichenot.

Body much more elongate than in *Calamus proridens*, with which it seems otherwise to agree; the depth 2¾ in length. Upper jaw with a strong antrorse canine on each side, as in *C. proridens;* eye small; preorbital deep; cheeks with 6 rows of scales; dorsal high, pectoral reaching front of anal; preorbital with blue wavy stripes; cheeks with blue flexuous lines, anastomosed and forming rivulations; spinous dorsal edged with black (Guichenot). West Indies; known only from Guichenot's description, which has been verified for us on the original type by Mr. Alexander Thominot. (*pennatula*, diminutive of *penna*, a quill.)

Calamus pennatula, GUICHENOT, Revision des Pagels, 116, Martinique; JORDAN & FESLER, *l. c.*, 512.

1723. CALAMUS BAJONADO (Bloch & Schneider).

(JOLT-HEAD PORGY; BAJONADO.)

Head 3 in length (4 in total); depth 2⅗ (3 in total); eye large, 2½ (in young) to 5 (in adults) in length of head. D. XII, 12; A. III, 10. Scales 7–54–17. Body less elevated than in the two species preceding, the snout long and pointed, the anterior profile rising slowly in an even course to front of dorsal; in the young the anterior profile is more bluntly rounded, the supraorbital region more prominent, and the profile of snout steeper. Greatest depth of preorbital rather more than one-half length of head in adults 2 feet long, 2½ in head in young of 6 inches. Mouth moderate, maxillary not reaching vertical from orbit except in young, nearly half length of head in adults, 2½ in head in specimens of 8 inches. Anterior teeth of outer series much enlarged and stronger than the cardiform band, even in the young; in adults these become very strongly developed, and are then nearly as robust as the molars; their number seems to be normally 2 or 3 on each side in the upper jaw and 3 or 4 on each side in the lower, but this is subject to much variation; the upper jaw has frequently one of these more enlarged than the others, and canine-like. The molars, as usual in this genus, in 3 series in the upper jaw and 2 in the lower; besides these there is quite constantly toward the front of the jaw an interior supplemental series of molars, both above and below. Dorsal spines slender, the highest 2⅔ in head, the soft rays low; anal spines robust; pectorals long, reaching past origin of anal, 2¾ to 3 in length; ventrals nearly reaching vent, 1½ in head. Color in life, brassy, rather dull, and with little blue marking, the middle of each scale shining, but scarcely bluish; a blue stripe below eye, narrower and duller than in the preceding species, and extending well forward on preorbital; a second duller streak above this, the two meeting on forehead; preorbital dull coppery, often with irregular and obscure blue lines, these sometimes forming obscure veining, and always growing duller with age; lower jaw dull purplish; angle of mouth purplish and orange yellow; axil yellowish; no violet band on base of pectoral; fins plain, the ventrals sometimes slightly dusky, the caudal obscurely barred. A young specimen had 4 or 5 faint orange blotches along back. Length 2 feet. West Indies, north to Florida Keys; most abundant of the genus, and reaching a larger size than any of the others. The largest seen by us were 22 inches long. It is the dullest in color of the large species. (*bajonado*, the Cuban name, equivalent to bayonet, and probably alluding to the interhæmal.)

Bajonado, PARRA, Dif. Piezas Hist. Nat. Cuba, 13, lam. 8, 1787, Havana.
Sparus bajonado, BLOCH & SCHNEIDER, Syst. Ichth., 284, 1801; after PARRA.
Pagellus caninus, POEY, Memorias, II, 199, 1860, Havana.
Calamus plumatula, GUICHENOT, Rev. Pagels, 119, Martinique; JORDAN, Proc. U. S. Nat. Mus. 1886, 537; reexamination of type.
Pagellus bajonado, POEY, Proc. Ac. Nat. Sci. Phila. 1863, 177.

Calamus bajonado, POEY, Ann. Lyc. Nat. Hist. N. Y., x, 1872, 176, pl. vi, fig. 1; POEY, Enumeratio, 55, 1875; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 20; JORDAN & FESLER, *l. c.*, 512.

Subgenus GRAMMATEUS, Poey.

1724. CALAMUS BRACHYSOMUS (Lockington).

(MOJARRA GARABATA.)

Head 3⅓; depth 2⅙; eye moderate, about 4½ in head in adult; scales 6–50–13. D. XII, 11; A. III, 10. Body much compressed, short and deep, the back considerably elevated, the anterior profile steep and regularly convex from base of first dorsal spine to point of snout; snout short, 1¾ to 2 in head; mouth small, maxillary about 2⅖ in head. Canines short and strong, about $\frac{6-8}{6-8}$; no antrorse canines; preorbital narrow, its least width 2½ to 3¾ in head; gill rakers very small, about 4 + 6. Pectoral narrow and long, reaching to the vertical from the origin of first anal ray, about 2½ in body; second and third anal spines about equal, 3 in head; fifth dorsal spine 2 in head. Snout, interorbital, preorbitals, suborbitals, and chin, naked; scales on cheek in about 5 series. Color brassy olive with darker crossbands and few violet marks; preorbital plain brownish, an inky axillary spot; ventrals dusky. Length 15 inches. Gulf of California and neighboring waters; locally abundant from Magdalena Bay to Mazatlan; a food-fish of some importance. (*βραχύς*, short; *σῶμα*, body.)

Sparus brachysomus, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 284, Magdalena Bay, Lower California.

Calamus brachysomus, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 153; JORDAN & FESLER, *l. c.*, 512.

1725. CALAMUS LEUCOSTEUS, Jordan & Gilbert.

(WHITE-BONE PORGY.)

Head 3¼; depth 2⅕; eye rather large, 3⅗ in head in adults; scales 7 or 8–51–14. D. XII, 12; A. III, 10. Body formed much as in *Calamus penna*, short and deep, with steep anterior profile and high, arched back, the profile nearly straight from snout to above eyes, thence convex. Head deeper than long, the preorbital region very deep, its least depth 2¼ in head, half greater than interorbital width. A strong blunt prominence before eye. Mouth rather large, the maxillary 2⅖ in head. Outer teeth in both jaws moderately enlarged, canine-like, about 10 in each jaw, none of them directed forward; gill rakers very short and wide apart, about 3+6. Highest dorsal spine 2⅕ in head; pectorals very long, reaching to the vertical from base of third anal spine, 2⅗ in length of body; ventrals 1⅖ in head. Scales large, those on cheeks in 5 rows. Smutty silvery; sides with vague crossbars; dorsal and anal fins with dark blotches; ventrals dusky; no black axillary spot. South Atlantic coast of United States, in rather deep water, known only from the markets of Charleston, South Carolina. Length about a foot. (*λευκός*, white; *ὀστέον*, bone, from the common name, the application of which is unknown to us.)

Calamus bajonado, JORDAN & GILBERT, Synopsis, 926, 1883; not *bajonado*, BLOCH & SCHNEIDER.

Calamus leucosteus, JORDAN & GILBERT, in JORDAN, Cat. Fishes N. A., 91, 1885, Charleston (Coll. Charles C. Leslie); JORDAN & FESLER, *l. c.*, 513.

1726. CALAMUS MACROPS, Poey.

Head $3\frac{1}{10}$; depth $2\frac{1}{5}$; eye large, about 3 in head. D. XI, 12; A. III, 10. Body rather elongate; scales large; dorsal outline forming a comparatively regular arch, the back being elevated, the anterior profile steep and nearly straight. Canines small, about 10 to 12; preorbital narrow, about equal to eye; mouth small, the maxillary about $2\frac{1}{2}$ in head. Color plumbeous gray, with a blue spot on each scale; preorbital with blue streaks; a blue streak below eye; a blue point in the axil; fins pale (Poey). Cuba; known only from Poey's description and figure. (*μακρός*, large; *ὤψ*, eye.)

Calamus macrops, POEY, Ann. Lyc. Nat. Hist, N. Y. 1872, 181, fig. 3, Havana; JORDAN & FESLER, *l. c.*, 513.

1727. CALAMUS TAURINUS (Jenyns).

Head 3 to $3\frac{1}{3}$; depth $2\frac{1}{4}$; eye $4\frac{1}{3}$; scales 6–46–14. D. XII, 12; A. III, 10. Body rather elevated, deeper than in *Calamus arctifrons*, the anterior profile rather evenly curved, but not very strongly convex. Head narrowed above, but broad through the supraorbital region; profile rising from nape to front of dorsal, the occipital crest as high as eye; preorbital very deep, its least depth = maxillary, $2\frac{1}{6}$ in head. Mouth large, not reaching vertical from front of orbit. Outer teeth moderately enlarged, normally placed, the large teeth $\frac{9}{10}$. Eye moderate, $1\frac{1}{3}$ in interorbital, 2 in preorbital. Longest dorsal spine $2\frac{3}{5}$; pectoral very long, $2\frac{1}{5}$ in body, reaching second anal spine, which is 4 in head. Color dull silvery, with faint dark crossbands; preorbital plain; anal dusky; ventrals pale; edge of opercle dusky. Galapagos Islands to Peru. We have examined many specimens in the museum at Cambridge, from Charles Island, one of the Galapagos. The above description from a specimen from Payta, Peru. (From *taurus*, bull; bullheaded.)

Chrysophrys taurina, JENYNS, Zool. Beagle, Fishes, 56, pl. VII, 12, 1842, Galapagos Islands (Coll. Charles Darwin); VALENCIENNES, Voyage Vénus, V, 330, 1846.

Chrysophrys cyanoptera, VALENCIENNES, Voyage Vénus, V, pl. 4, fig. 2, 1846, Charles Island, Galapagos Group.

Calamus taurinus, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 181; JORDAN & FESLER, *l. c.*, 513.

1728. CALAMUS PENNA (Cuvier & Valenciennes).

(LITTLE-MOUTH PORGY; SHEEPSHEAD PORGY.)

Head 3 to $3\frac{1}{4}$; depth $2\frac{1}{6}$ ($2\frac{3}{4}$ in total); eye rather small, $3\frac{3}{4}$ to $4\frac{1}{3}$ in head in specimens from 6 to 11 inches long. D. XII, 12; A. III, 10; scales 6–48–13. Body somewhat higher than in *C. bajonado*. Anterior profile evenly convex to front of dorsal, rising slowly and not strongly arched. Preorbital low, $2\frac{3}{5}$ to 3 in head, about equaling interorbital width. Mouth moderate, the maxillary scarcely reaching vertical from front of orbit, $2\frac{1}{2}$ to $2\frac{2}{3}$ in head. Outer series of teeth anteriorly in both jaws somewhat enlarged, small and uniform in size, 8 to 10 in each jaw; no accessory row of molars in either jaw. Dorsal low, the highest dorsal spine about $2\frac{1}{3}$ in head; pectorals about reaching vertical from front of anal, $3\frac{1}{2}$ in length; ventrals 1⅔ to 2 in head. Scales large, in about 5 vertical series on cheeks. Color dull silvery with pearly markings, without blue stripes; a faint pale streak below eye; axil with a small inky black spot; ventrals blackish; dark crossbars on body usually persistent. A small specimen in the museum at Cambridge, which may be the type of Poey's *Pagellus humilis*, belongs to this species. This example is 6 inches long, the eye nearly 4 in head, the depth 2⅓ in length, and the pectoral as long as head. The type of *Calamus microps* Guichenot, is in the museum at Paris. It agrees with *Calamus penna* in all respects except the size of the eye, which is 4⅘ in head. Southern Florida to Brazil, common; known from Charlotte Harbor, Key West, Rio Janeiro, St. Thomas, Havana, Camaru, and Rio Grande do Sul. (*penna*, a quill or pen.)

Pagellus penna, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 209, 1830, Brazil.
Pagellus microps, GUICHENOT, in Ramon de la Sagra, Hist. Cuba, 188, pl. 3, fig. 1, 1845, Havana.
Pagellus humilis, POEY, Synopsis, 308, 1868, Havana.
Pagellus milneri, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 134, Charlotte Harbor, Florida. (Type, No. 6134. Coll. C. B. Baker.)
Grammateus humilis, POEY, Enumeratio, 56, 1875.
Sparus milneri, JORDAN & GILBERT, Synopsis, 556.
Calamus penna, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 21; JORDAN & FESLER, *l. c.*, 514.

1729. CALAMUS ARCTIFRONS, Goode & Bean.

(GRASS PORGY; SHAD PORGY.)

Head 3¼; depth 2⅖; scales 6–48–13. D. XII, 12; A. III, 10. Body oblong, the back little elevated, not nearly so much as in *C. penna*, the anterior profile unevenly curved, very convex before eye; head narrow above; dorsal outline not forming a regular arch, the anterior profile straight from base of spinous dorsal to nape, where a rather sharp angle is formed, thence straightish above eye, the snout convex; nearly straight along base of spinous dorsal; scales on cheek in 4 or 5 series; the orbitals, snout, chin, and edge of preopercle, naked. Preorbital deep, its depth 2¼ in head, and nearly twice diameter of eye, which is 4 to 5 in head; pectoral 3⅖ in body, reaching past tips of ventrals; longest dorsal spine 2½ in head; third anal spine the longest, 5; canine teeth 8–10; gill rakers small and blunt, about 4 + 6. Color olivaceous with dark bars or spots, the centers of many scales pearly; 6 yellowish spots along the lateral line; preorbital brownish, usually with dashes of golden yellow; membrane of opercle orange; fins mostly barred or spotted; ventrals pale, faintly barred. Gulf of Mexico, from Pensacola to Key West; a small porgy common in the eelgrass about Key West, and ranging northward at least to Pensacola; not known from the West Indies. (*arctus*, contracted; *frons*, forehead.)

Calamus arctifrons, GOODE & BEAN, Proc. U. S. Nat. Mus. 1882, 425, Pensacola (Type, No. 30163. Coll. Silas Stearns); JORDAN & GILBERT, Synopsis, 928; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 23; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 232; JORDAN & FESLER, *l. c.*, 514.

1730. CALAMUS MEDIUS (Poey).

Head $3\frac{1}{3}$; depth $2\frac{1}{2}$; scales ?-46-?. D. XII, 12; A. III, 10. Body subeliptical, rather elongate, deepest at front of dorsal, the anterior profile rather strongly convex, the curve continuous from snout to middle of dorsal. Preorbital not deep, its depth $2\frac{1}{2}$ in head; pectoral short, $1\frac{1}{5}$ in head; canines $\frac{8}{8}$, moderate, equal. Color olivaceous, with darker cross bands; preorbital plain; ventrals dark; a dark axillary spot; a blue subocular band. West Indies, here described from a specimen from Havana (21838, M. Z. C.), 15 inches long. The species is allied to *C. penna*, differing in the more elongate form. (*medius*, medium.)

Grammateus medius, POEY, Ann. Lyc. Nat. Hist. N. Y. 1872, 183, pl. 7, fig. 4, Havana; POEY, Enumeratio, 56, 1875.
Calamus medius, JORDAN & FESLER, *l. c.*, 514.

553. PAGRUS, Cuvier.

(EUROPEAN PORGIES.)

Pagrus, CUVIER, Règne Animal, Ed. I, 272, 1817 (*argenteus* = *pagrus*).

Body oblong, compressed, covered with large scales. Head large; preopercle entire; opercle not armed. Mouth rather small, terminal, low, the anterior teeth in the jaws cardiform, the outer series of teeth generally enlarged, canine-like, not compressed, the teeth behind the canines slender and acute. Both jaws with 2 or 3 series of rounded molar teeth, which are sometimes irregularly mixed with slender teeth; no teeth on vomer or palatines. Posterior nostril oblong, not slit-like, much larger than anterior. Dorsal rather low, the spines about 12 in number, depressible in a groove; anal spines moderate, the second not greatly developed; second interhæmal spine not pen-shaped; no antrorse dorsal spine; supraoccipital crest coalescent with temporal crests. Caudal fin forked; air bladder simple; gill rakers short; branchiostegals 6; intestinal canal short; pyloric cœca few. Carnivorous fishes, mostly of Europe and Africa. This genus is close to the European genus *Sparus* (*Sparus aurata L.* = *Aurata* Risso = *Chrysoblephus* Cuvier), with which it agrees in the skeletal characters, differing chiefly in the larger scales, slenderer body, and narrower bands of teeth. The genera are probably distinct, but the characters of division have not yet been fully indicated.* (*πάγρος*, porgy, the ancient name.)

1731. PAGRUS PAGRUS (Linnæus).

(RED PORGY; BESUGO; PARGO COLORADO.)

D. XI, 12, or XII, 11 or 10; A. III, 8; scales 6 (9) -53 to 56-13. Body oblong, the back moderately elevated, the profile parabolic; preorbital deep, much wider than the small eye. Molar teeth in two series; teeth behind the canines slender; scales large. Dorsal spines not elongate, the front longest, about 2½ in head; soft dorsal and anal pointed behind; caudal well forked; second anal spine stronger but not longer than third, about 4 in head; pectoral fin elongate, longer than head, reaching about to fourth soft ray of anal. American specimens show in life the following coloration: Color golden-olive, the middle of each scale largely pinkish-red, giving a general reddish hue to the fish; sides and below silvery, flushed with red; many scales of back and sides each with a small round spot of deep purplish-blue, those forming distinct longitudinal streaks on the sides below lateral line, the series somewhat irregular, running along the margins of the scales; above the lateral line these spots are somewhat scattered, forming very irregular oblique series, running upward and backward; a few of these spots on nape and upper part of opercle; a dark spot on upper part of orbital rim; snout tinged with purplish, occiput with olive; edge of opercle dusky; vertical fins largely orange, their edges translucent; spinous dorsal somewhat dusky; ventrals pale, with a pinkish blotch at base; pectorals yellowish, especially at base, the axil somewhat dusky. Length 2 feet. Southern Europe and South Atlantic and Gulf coasts of the United States, south to Uruguay, in rather deep water. (Eu.) This species, common in southern Europe, has been several times taken on the snapper banks off Pensacola and at Charleston. Dr. Berg says that it is also common in various localities along the coasts of Argentina and Uruguay. There seems to be no difference between American and European specimens, except that in European descriptions we find no allusions to the blue spots characteristic of the American fish. (πάγρος, pagrus, the old name, which has become *pargo* and *porgy* in modern tongues.)

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* Cuvier recognized 2 genera: *Pagrus* with the molar teeth in 2 series, and *Sparus* (*Chrysophrys*) with the molars in 3 or more. This character has not much importance, and Steindachner has proposed to substitute for it the following:

Sparus: Teeth behind the canines with the apex rounded, granulated, or globose; molars in 2 or more series.

Pagrus: Teeth behind the canines acute, subulate, or setaceous; molars in 2 or more series.

Although in general appearance *Sparus aurata* and *Pagrus pagrus* differ considerably, and also considerably from other aberrant species, as *Chrysoblephus gibbiceps* and *Argyrops spinifer*, there is no important difference in the skull or skeleton, and all may perhaps be referable to a single genus, *Sparus*.

Sparus pagrus, LINNÆUS, Syst. Nat., Ed. X, 279, 1758, Southern Europe; JORDAN, Proc. U. S. Nat. Mus. 1882, 278; JORDAN & FESLER, *l. c.*, 516; BERG, Ann. Mus. Nat. de Buenos Aires 1895, 49.

Pagrus vulgaris, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 142, 1830, Southern Europe; GÜNTHER, Cat. Fishes, I, 466.

Sparus argenteus, BLOCH & SCHNEIDER, Syst. Ichth., 271, 1801.

Pagrus argenteus, CUVIER, Règne Animal, Ed. I, 272, 1817; GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 133.

554. LAGODON, Holbrook.

(CHOPA SPINA.)

Lagodon, HOLBROOK, Ichth. South Carolina, 59, 1860 (*rhomboides*).

The essential character of this genus is in the form of the skull. Supraoccipital and temporal crests nowhere coalescent, the interorbital area not swollen; frontal bone in the interorbital area thin, concave in transverse section; temporal crest low, separated from supraoccipital crest by a flattish area which extends forward on each side of supraoccipital crest and to groove of premaxillary spines. Otherwise essentially as in *Archosargus*, the antrorse dorsal spine present, the second interhæmal not modified. One species, the incisors deeply notched. (λαγώς, hare; ὀδών, tooth.)

1732. LAGODON RHOMBOIDES (Linnæus).

(PINFISH; BREAM; SAILOR'S CHOICE; CHOPA SPINA.)

Head $3\frac{1}{5}$; depth 2 to $2\frac{2}{3}$; eye 4. D. XII, 11; A. III, 11; scales 10–65 to 70–17. Body elongate, elliptical; head flattened, muzzle pointed, profile not very steep; eye moderate, $1\frac{1}{3}$ to $1\frac{1}{2}$ in snout, 1 in interorbital; mouth moderate, maxillary not reaching front of orbit, $3\frac{1}{3}$ in head; incisors $\frac{4}{4}$, all deeply notched; molars in two series in each jaw; gill rakers 6 + 13; dorsal spines all rather high, the highest about 2 in head; caudal deeply forked; second anal spine not longer than third; ventrals short and broad, pectorals moderate, upper rays reaching past origin of anal. Color, in life, olivaceous, the sides bluish-silvery; a humeral spot and traces of 6 vertical bars; gilt stripes much less intense than in *Archosargus unimaculatus*, much broader than the interspaces; about 7 stripes below the lateral line, those above it more or less confluent; dorsal fin pale bluish, with a submedian gilt band and a gilt edging; caudal yellow, faintly barred; anal bluish, with a medium yellowish band; ventrals mesially yellowish; pectorals plain. Length 6 inches. Atlantic and Gulf coasts of the United States, Cape Cod to Cuba; excessively common all along the eastern coast of the United States south of New York, and on the Gulf coast as far west as Pensacola; too small to be much used as food. (*ῥόμβος*, rhomb; *εἶδος*, appearance.)

Sparus rhomboides, LINNÆUS, Syst. Nat., Ed. XII, 470, 1766, Charleston. (Coll. Dr. Garden.)
Sargus rhomboides, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 68, pl. 143, 1830; GÜNTHER, Cat. Fishes, I, 447, 1859.
Diplodus rhomboides, EIGENMANN & HUGHES, Proc. U. S. Nat. Mus. 1887, 66; JORDAN & FESLER, *l. c.*, 518.

555. ARCHOSARGUS, Gill.

(SHEEPSHEADS.)

Archosargus, GILL, Canadian Naturalist, August, 1865 (*probatocephalus*).
Salema, JORDAN & EVERMANN, Check-List, 390, 1896 (*unimaculatus*).

Body robust, short and deep, compressed, covered with large scales. Head deep, mouth moderate, the jaws with broad incisors in front and coarse molars on the sides; incisors entire or with a shallow notch; posterior nostril slit-like; opercles entire. Dorsal and anal spines strong, the soft parts of the fin short and rounded; a procumbent spine before the dorsal; caudal forked. Gill rakers small. Supraoccipital and temporal crests coalescent anteriorly, both disappearing in the gibbous interorbital area; frontal bone between eyes transversely convex and more or less honeycombed; temporal crest separated from occipital crest by an excavated area, bounded anteriorly by the lateral crest, which merges into the supraoccipital above eye. This genus, like *Lagodon*, *Stenotomus*, and *Otrynter*, which show the same character of the procumbent dorsal spine, is confined to American waters. There are two color types in the genus, one group being made up of the species with broad black crossbands, the other of species with golden streaks and inconspicuous crossbands, resembling the species of *Lagodon*. (*ἀρχός*, chief; *σάργος*, *Sargus*, an old name of *Diplodus*.)

SALEMA (Spanish name):

a. Occipital crest rather thin, its honeycomb structure not exposed. Species with streaks of steel-blue and golden, the dark cross bands narrow, disappearing with age; about one-third the interspaces; a black humeral spot.

b. Dorsal spines 13; incisors ¾ on each side; side of back with 8 or 9 golden streaks, which are narrower than the metallic-blue interspaces.

c. Scales 9–48–15; pectoral fin not quite reaching second anal spine; body rather deep and compressed. Incisors ¾ on each side, entire, or with a shallow notch. Fifth dorsal spine highest, 2 to 2½ in head; second anai spine strong, recurved, 2½ in head. Olivaceous, silvery below, the upper parts with golden longitudinal stripes alternating with bluish interspaces; humeral spot larger than eye. UNIMACULATUS, 1733.

cc. Scales 7 or 8–48–15; pectoral fin reaching second anal spine; body rather less deep, the snout a little longer; ventrals shorter, 5 to 5⅔ in head; otherwise essentially as in the preceding, of which it is the Pacific coast representative. POURTALESII, 1734.

bb. Dorsal spines 12; incisors ⅗ on each side. Profile with a slight depression above the eye; second anal spine much longer than the third. Color grayish. belly white; 8 golden longitudinal bands; a bláck shoulder spot. TRIDENS, 1735.

ARCHOSARGUS:

aa. Occipital crest broad, its honeycomb structure plainly exposed at its upper margin; dorsal spines 12; species without blue or golden markings, but with about seven broad black cross bands crossing the body; no distinct shoulder spot. Body much compressed; dorsal outline strongly arched; ventral outline almost straight. Profile straight and steep anteriorly. Incisors ¾, entire or slightly emarginate, serrate in the young; molars in 3 series above, in 2 below, those of the inner series larger, those behind the incisors very small. Highest dorsal spine 1⅓ in head; second anal spine about twice in head, much longer than third.

d. Incisors broad, their breadth about half their length. Scales 8–48–15. PROBATOCEPHALUS, 1736.

dd. Incisors narrower, their breadth 2½ in their length. Scales 7–44–14. ARIES, 1737.

Subgenus SALEMA, Jordan & Evermann.

1733. ARCHOSARGUS UNIMACULATUS (Bloch).

(SALEMA.)

Head 3½; depth 2 to 2½; eye large, 3⅔ to 4 = preorbital, or 1⅓ to 1½ in interorbital width. D. XIII, 10; A. III, 10 or 11; scales 8 or 9–45 to 50–14 to 16. Body rather deep and compressed, profile rounded, steep; mouth moderate, maxillary not reaching front of orbit, 3 to 3⅓ in head; occipital crest rather thin, its honeycomb structure not exposed. Incisors ¾ on each side, entire, or with a shallow notch; molars 3-rowed above, 2-rowed below; gill rakers small, about 6+8; cheeks with 5 rows of scales. Fifth dorsal spine highest, 2 to 2½ in head; second anal spine strong, recurved, 2 to 2½ in head; pectorals long, reaching to anal spines, about 2½ in body, ventrals moderate, 4½ to 4⅘ in length of body, not nearly reaching vent. Olivaceous, silvery below, the upper parts with golden longitudinal stripes alternating with bluish interspaces; a black humeral spot larger than eye. West Indies; north to Key West, south to Rio Janeiro, very common about Key West and Havana; recorded by Gronow from South Carolina, but not seen by us from localities north of the Florida Keys. (*unimaculatus*, having 1 spot.)

Salema, MARCGRAVE, Hist. Pisc., 153, 1648, Brazil.
Bream, BROWNE, Jamaica, 446, No. 1, 1756, Jamaica.
Perca unimaculata, BLOCH, Ichthyologia, pl. 308, 1792, Brazil; on a figure by Prince MAURICE.
Sparus salin, LACÉPÈDE, Hist. Nat. Poiss., IV, 136, 1803; based on *unimaculatus* of BLOCH.
Sargus humeri-maculatus, QUOY & GAIMARD, Voyage Freycinet, Zool., 297, 1825, Rio Janeiro.
Sargus flavolineatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 60, 1830, Cuba; GÜNTHER, Cat. Fishes, I, 446, 1859.
Cynædus brama, GRONOW, Cat. Fishes, Ed. Gray, 56, 1854, South Carolina.
Sargus caribæus, POEY, Memorias, II, 197, 1860, Cuba.
Grammistes unimaculatus, BLOCH & SCHNEIDER, Syst. Ichth., 184, 1801; after BLOCH.
Sargus unimaculatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 62, 1830; GÜNTHER, Cat. Fishes, I, 446, 1859; EIGENMANN & HUGHES,* Proc. U. S. Nat. Mus. 1887, 69.
Diplodus caribæus, JORDAN & GILBERT, Synopsis, 930, 1883.
Diplodus flavolineatus, JORDAN, Proc. U. S. Nat. Mus. 1886, 42.
Archosargus unimaculatus, JORDAN & FESLER, *l. c.*, 520.

1734. ARCHOSARGUS POURTALESII (Steindachner).

Head $3\frac{1}{2}$; depth $2\frac{2}{3}$. D. XIII, 10; A. III, 10; scales 7 or 8–48–15. Pectoral fin reaching second anal spine; body rather less deep, the snout a little longer; ventrals shorter, 5 to $5\frac{2}{3}$ in head; otherwise essentially as in *Archosargus unimaculatus*, of which it is the Pacific coast representative. Galapagos Islands, rather scarce, one specimen obtained by the *Albatross* on Chatham Island. The differences between the *pourtalesii* and *unimaculatus* are very slight, and might be ignored were it not for the remote and restricted habitat of the Pacific form. (To Louis F. de Pourtales, a friend and associate of Agassiz, who was with him on the Hassler expedition, by which this fish was discovered.)

Sargus pourtalesii, STEINDACHNER, Fische Afrikas, 39, 1881, Galapagos Islands.
Archosargus pourtalesii, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 186; JORDAN & FESLER, *l. c.*, 521, 1893.

1735. ARCHOSARGUS TRIDENS (Poey).

Head more than 4; depth $2\frac{9}{10}$ in total length with caudal; eye $3\frac{1}{2}$ in head, 1 in snout. D. XII, 10; A. III, 9; maxillary extending to a point between the pupil and the anterior border of the eye. Incisors $\frac{3}{3}$ on each side. Profile with a slight depression above the eye; second anal spine much longer than the third. Color grayish, belly white; 8 golden longi-

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* The specimens examined by Eigenmann and Hughes, now before us, differ decidedly in the proportions, the color, and the size of the teeth; but while the differences of the extremes are very marked, the intergradation is so perfect that no tangible specific distinctions can be made out. We have only the deeper form (*flavolineatus*) from Key West, while we have both extremes from Havana. So far as we are able to judge from the figures and the descriptions, the *unimaculatus* of Bloch & Schneider, Cuvier & Valenciennes, and Jordan & Gilbert, the *caribæus* of Poey, and the *humeri-maculatus* Quoy & Gaimard, represent the more slender form, while the *flavolineatus* Cuvier & Valenciennes represents the deeper form. The differences of the extreme forms seem to be these:

The deeper form (*flavolineatus*):	*The more slender form* (*unimaculatus*):
Greatest depth, 2 in length.	Greatest depth, $2\frac{1}{2}$ in length.
Ventral outline very much rounded.	Ventral outline almost straight.
Distance from insertion of first dorsal spine, obliquely to snout, $1\frac{1}{4}$ in depth.	Distance from insertion of first dorsal spine, obliquely to snout, 1 in depth.
Teeth about $\frac{1}{3}$ narrower than in the more slender form.	
Body more compressed.	

tudinal bands; a black shoulder spot. (Poey.) Cuba; known only from the description of Poey. Its distinctive characters need verification, it being possibly an abnormal specimen of *Archosargus unimaculatus.* (*tres*, three; *dens*, tooth.)

Sargus tridens, POEY, Ennumeratio, 57, 1875, Cuba.
Archosargus tridens, EIGENMANN & HUGHES, Proc. U. S. Nat. Mus. 1887, 70; JORDAN & FESLER, *l. c.*, 521, 1893.

Subgenus ARCHOSARGUS.

1736. ARCHOSARGUS PROBATOCEPHALUS (Walbaum).

(SHEEPSHEAD; SARGO RAIADO.)

Head 3 to 3⅓; depth 2 to 2½; eye placed high, 4 in head, 1⅓ in interorbital, 1¼ in suborbital. D. XII, 10 or 12; A. III, 10 or 11; scales 8–48–15; mouth large, nearly horizontal; maxillary 2⅔ in head; incisors ¾, entire or slightly emarginate, serrate in the young, broad, their breadth about ½ their length; molars in 3 series above, in 2 below; those of the inner series larger, those behind the incisors very small, gill rakers about 3+6. Highest dorsal spine 1⅓ in head; dorsal and anal spines notably heteracanthous. Caudal not deeply forked; second anal spine about 2 in head, much longer than the third; ventrals not nearly reaching vent; pectorals reaching past beginning of anal, slightly longer than head. Occipital crest broad, its honeycomb structure plainly exposed at its upper margin. Color grayish, with about 7 broad black cross bands crossing the body, these most distinct in young; no distinct shoulder spot; spines silvery. Atlantic and Gulf coasts of the United States; Cape Cod to Florida Keys and Texas; one of the most common and most valuable of the food-fishes of our Atlantic coast, its flesh being especially excellent in flavor. (*πρόβατον*, sheep; *κεφαλή*, head.)

Sparus (Sheepshead), SCHÖPF, Schriften der Gesellsch. Naturf. Freunde, VIII, 152, 1788, New York.
Sparus probatocephalus, WALBAUM, Artedi Pisc., 295, 1792, New York; based on SCHÖPF.
Sparus ovicephalus, BLOCH & SCHNEIDER, Syst. Ichth., 280, 1801, New York; based on SCHÖPF.
Sargus ovis, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1814, 392, pl. 2, fig. 5, New York; CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 53, 1830; GÜNTHER, Cat., I, 447, 1859.
Archosargus probatocephalus, GILL, Cat. Fish. East Coast North America, 27, 1873; JORDAN & FESLER, *l. c.*, 522, 1893.
Diplodus probatocephalus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 278; JORDAN & GILBERT, Synopsis, 558, 1883.

1737. ARCHOSARGUS ARIES (Cuvier & Valenciennes).

Head 3⅓; depth 2⅓. D. XII, 11; A. III, 10; scales 7–44–14. Incisors narrower than in *A. probatocephalus*, their breadth 2½ in their length. Grayish with about 6 dark crossbars. Otherwise as in *A. probatocephalus*. Honduras to Brazil, rather rare; known from Rio Janeiro, Maracaibo, and Belize; only the original type seen by us. It would appear to be closely allied to *A. probatocephalus*, distinguishable only by the slightly narrower teeth and possibly larger scales. It is probably to be regarded as a geographical variety or southern representative of the common sheepshead. (*Aries*, the ram.)

Sargus aries, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 58, 1830, Rio Janeiro; Maracaibo; GÜNTHER, Cat. Fishes, I, 449; GÜNTHER, Fishes Cent. America, 386, 1864.
Archosargus probatocephalus aries, EIGENMANN & HUGHES, Proc. U. S. Nat. Mus. 1887, 69.
Archosargus aries, JORDAN & FESLER, *l. c.*, 522, 1893.

556. DIPLODUS, Rafinesque.

Diplodus, RAFINESQUE, Indice d'Ittiologia Siciliana, 54, 1810 (*annularis*).
Sargus, CUVIER, Règne Animal, Ed. 1, 272, 1817 (*sargus*); name preoccupied in Insects.

Body oblong or ovate, more or less compressed, the back elevated; mouth rather small, terminal, low. Incisors broad, truncate, entire; a series of smaller teeth behind them. Molar teeth mostly in 2 or 3 rows. No teeth on vomer or palatines. Scales moderate. Dorsal spines usually 12, strong, depressible in a groove; anal spines rather strong. Caudal fin forked; interhæmals unmodified; first spine-bearing interneural without antrorse spine above; skull essentially as in *Archosargus*, the frontal bone more cavernous. Gill rakers short and slender. Branchiostegals 6. Intestinal canal short; pyloric cœca few. Coloration usually silvery, with a black blotch on the back of the tail; young with black crossbars. Carnivorous species, chiefly European; valued as food. The genus *Diplodus* differs from *Archosargus* chiefly in the absence of a procumbent dorsal spine. The skull in *Diplodus* resembles that of *Archosargus*, but the cavernous or honeycombed structure of the interorbital area is still more prominent. (*διπλόος*, double; *ὀδούς*, tooth, from the two forms of teeth.)

a. Scales large, about 56 in lateral line. HOLBROOKII, 1738.
aa. Scales smaller, 62 to 65 in lateral line.
  b. Eye large, 3½ in head, 1 in snout. ARGENTEUS, 1739.
  bb. Eye smaller, 4⅓ in head, 1½ in snout. SARGUS, 1740.

1738. DIPLODUS HOLBROOKII (Bean).

Head 3⅔; depth in adult 2⅛; eye 4½ in head, 1½ in snout, or 1¾ in preorbital. D. XII, 14 or 15; A. III, 13; scales 7–56–14. Body regularly elliptical, moderately compressed; profile regularly rounded, not as steep as in *Diplodus argenteus*; mouth large, almost horizontal; maxillary not reaching front of eye, 3⅓ in head; incisors $\frac{4}{4}$, inserted obliquely; molars in 3 series above and 2 below; gill rakers ½ diameter of pupil, about 7+14; longest dorsal spine 2⅓ to 2⅔ in head; caudal deeply forked; second anal spine little larger than third, 3½ in head; ventrals reaching half way to anal fin; pectorals not reaching to first anal spine, 3⅓ in body; cheeks with 4 rows of scales; steel-blue above, paler below, a broad black border on the operculum; a black spot on the upper part of base of pectoral; a broad black bar extending across caudal peduncle above. South Atlantic and Gulf coasts of the United States; Cape Hatteras to Cedar Keys; rather common as far north as Beaufort, where the young swarm about the wharves. (Named for John Edwards Holbrook, the distinguished author of the Ichthyology of South Carolina.)

Sargus holbrookii, BEAN, Forest and Stream, June 13, 1878, Charleston; BEAN, Proc. U. S. Nat. Mus. 1878, 198; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 379.

Diplodus holbrookii, JORDAN & GILBERT, Synopsis, 559; EIGENMANN & HUGHES, Proc. U. S. Nat. Mus. 1887, 72; JORDAN & FESLER, *l. c.*, 534, 1893.

Diplodus caudimacula, JORDAN & GILBERT, Synopsis, 559, 1883; young; not *caudimacula* of POEY.

1739. DIPLODUS ARGENTEUS (Cuvier & Valenciennes).

(SARGO.)

Head 3½; depth 1⅞; eye 3½; snout 3½. D. XII, 14; A. III, 13; scales 8–62–16. Body much compressed; dorsal outline notably elevated; profile almost straight, very steep; mouth moderate, almost horizontal; maxillary 3⅓ in head; incisors $\frac{4}{4}$, placed as in *D. holbrookii*; molars in 3 or 4 series above, 2 or 3 below. Longest dorsal spine 2½ in head; caudal long, forked; second anal spine much stouter and ⅓ longer than third, 2⅔ in head; ventrals reaching half way to second anal ray; pectorals reaching to first anal spine. Steel-blue above, silvery below; a blackish border on the operculum; a black spot on the upper part of the base of pectorals; five or six very narrow, oblique blackish crossbars; black bar not extending entirely across caudal peduncle. West Indies; Florida and the Bermudas south to Argentina; here described from a specimen from New Smyrna, Florida, obtained by Mr. William P. Shannon, the only record for the United States. The types of *Sargus argenteus* in the Museum at Paris are identified as belonging to the same species as the types of *Sargus caudimacula* which are in the National Museum. (*argenteus*, silvery.)

Sargus argenteus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 60, 1830, Brazil; GÜNTHER, Cat. Fishes, I, 444; GÜNTHER, Shore Fishes, 5, 7, 1880.

Sargus caudimacula, POEY, Memorias, II, 198, 1860, Cuba; POEY, Synopsis, 310, 1868.

Diplodus argenteus, EIGENMANN & HUGHES, Proc. U. S. Nat. Mus. 1887, 73; JORDAN & FESLER, *l. c.*, 524, 1893; BERG, Ann. Mus. Buenos Aires 1895, 50.

1740. DIPLODUS SARGUS (Linnæus).

(SARGO.)

Head about 3¼; depth about 2; eye 4⅓ in head, 1½ in snout, 1⅓ in interorbital. D. XI or XII, 12 to 15; A. III, 13 or 14; scales 8–65–16; pectoral 2½ in body; ventrals 4; upper caudal lobe 3⅔; second anal spine 3½ in head; incisors rather broad, implanted obliquely; 3 or 4 series of molars above, 2 or 3 below; crown of head convex, a protuberance above the anterior angle of the orbit; preorbital not entirely covering maxillary; gill rakers short and thick, about 6 + 11; pectoral fin extending to origin of anal, ventrals nearly to vent. Color silvery or shining golden, with many narrow longitudinal dusky stripes (8 or 9 above lateral line, 15 or 16 below), and with 4 or 5 narrow blackish crossbands, the first between the origin of the dorsal and the axil. Coast of southern Europe; once recorded from the Bermudas (Goode); known to us only from descriptions in the American fauna on the record of Dr. Goode. Here described from a specimen from the Canary Islands. (Eu.) (*σάργος*, *sargus*, the ancient name of a species of this genus.)

Sparus sargus, LINNÆUS, Syst. Nat., Ed. x, 278, 1758, Mediterranean.
Sargus variegatus, LACÉPÈDE, Hist. Nat. Poiss., IV, 207, 1803, Mediterranean; GOODE, Cat. Fish. Bermuda, in Am. Jour. Science and Arts 1877, 292.
Sargus raucus, GEOFFROY ST. HILAIRE, Descr. de l'Egypte, Poiss., pl. XVIII, fig. I, 1813, Coast of Egypt.
Sargus rondeletii, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 14, pl. 141, 1830, Mediterranean.
Sargus vitula, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 48, 1830, Mediterranean.
Diplodus sargus, JORDAN & FESLER, *l. c.*, 525, 1893.

Family CLII. MÆNIDÆ.

(THE PICARELS.)

Body oblong or elongate, covered with moderate or small ciliated scales; mouth moderate or small, extremely protractile, the spines of the premaxillaries extending backward to the occiput; teeth small or wanting, all pointed; no incisors or molars; dorsal continuous or divided, the spines very slender; preopercle entire; intestine short, with few pyloric cœca. Carnivorous shore fishes, chiefly of the Old World. In the form of the mouth they present analogies to the *Gerridæ*, in other regards they closely resemble the *Hæmulidæ*. Genera 4 or 5; species about 25. (*Pristipomatidæ*, *b*, in part, Günther, Cat. Fishes, I, 386–396).

MÆNINÆ:
a. Jaws with small teeth; dorsal fin nearly continuous, its rays XI, 11; body compressed; scales moderate. SPICARA, 557.
EMMELICHTHYINÆ:
aa. Jaws toothless; dorsal fins 2, the spines very slender, 12 to 14 in number, some of them free; body elongate; lower pharyngeals with cardiform teeth. EMMELICHTHYS, 558.

557. SPICARA, Rafinesque.

Spicara, RAFINESQUE, Caratteri, etc., 51, 1810 (*flexuosa*=*smaris*).
Smaris, CUVIER, Règne Animal, Ed. I, 269, 1817 (*smaris*).

Body oblong, compressed, covered with moderate or small ciliated scales; mouth small, extremely protractile, the spines of the maxillaries extending backward to the occiput; vomer without teeth. Dorsal continuous or nearly so, its rays XI, 11, the spines very slender; preopercle entire; intestine short, with few pyloric cœca; scales 60 to 70. Shore fishes of the Old World; one of them on doubtful authority ascribed to the West Indies. This genus is chiefly confined to the Mediterranean and neighboring waters. (*Spicara*, a local name in Sicily, probably from *spica*, a spike.)

1741. SPICARA MARTINICA (Cuvier & Valenciennes).

Closely allied to the European species, *Spicara smaris*, but with the body rounded, compressed, the suborbital narrower and more notched. Color apparently plain, a small black spot on the side. D. XII, 11; A. III, 9. (Cuvier & Valenciennes.) West Indies. The type of this species, 4 inches long, is reputed to have been sent to Paris by Plée, from Martinique.

Very likely it is the common European picarel, *Spicara smaris* (L.), and it may have come from the coasts of France. Errors of locality are common in museums, and the "Cabinet du Roi" has not been exempt from them. (Name from Martinique.)

Smaris martinicus, Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 424, 1830, Martinique.
Spicara martinica, Jordan & Fesler, *l. c.*, 527, 1893.

558. EMMELICHTHYS, Richardson.

Emmelichthys, Richardson, Voyage Erebus and Terror, Fishes, 47, 1846 (*nitidus*).
Erythrichthys, Temminck & Schlegel, Fauna Japonica, Poiss., 117, 1847 (*schlegeli*).
Boxaodon, Guichenot, in Gay, Hist. Chili, ii, 208, 1847 (*cyanescens*).
Dipterygonotus, Bleeker, Contr. Ichth. Celebes, 1848 (*leucogrammicus*).
Inermia, Poey, Memorias, ii, 193, 1860 (*vittata*).

Body elongate, not much compressed, covered with moderate scales; head long; mouth moderate, oblique, premaxillaries excessively protractile; teeth obsolete; maxillary broad, scaly; lower jaw projecting; axillary scale large, preopercle entire or serrulate; opercle ending in a point. Dorsal fins separate, the first with slender spines, 1 or 2 of them free from membrane; soft dorsal short and low, naked, with a sheath of scales at base; both fins pointed behind; anal spines obscure; caudal widely forked. Pyloric cœca few. This genus contains about 5 species, bright colored fishes, inhabiting rather deep water or going in schools in the open seas. The species are not well known, and each one of them has been made the type of a distinct genus by authors not acquainted with related forms. We are not quite certain that *Emmelichthys* is prior to *Erythrichthys*, nor are we sure that but one genus of *Emmelichthyinæ* should be recognized. Our species, called *Inermia* (*inermis*, unarmed), agrees with *Emmelichthys* in having a rounded preopercle, that of *Erythrichthys* being nearly a right angle. *Erythrichthys* has larger scales and a very broad, scaly maxillary. *Emmelichthys* has the maxillary moderate, while in *Inermia* it is figured as narrow. (ἔν, within; μέλας, black; ἰχθύς, fish.)

Subgenus INERMIA, Poey.

1742. EMMELICHTHYS VITTATUS (Poey).

(Boga.)

Head 4; depth 4¾; eye 3⅓ in head; snout 3. D. XI, III–I, 10; A. III, 9; scales 100. Vertebræ 12+14. Body slender, fusiform, back rounded, the section of the body forming an oval of which the small diameter is ⅔ the large. Maxillary narrow, not wider than pupil, extending beyond front of eye, about 2½ in head; jaws subequal; premaxillary processes very long; jaws without teeth; pharyngeal teeth present; preorbital moderate, ½ diameter of eye; preopercle with its vertical limb entire, the angle with flat, thin serræ, the outline rounded, the bone cavernous anteriorly; lower jaw not cavernous; opercle with a rough point; nostrils small, placed high; lower jaw without pores; lateral line with a slight keel posteriorly. Body everywhere with small scales except on tip of snout;

dorsal fins slender; pectoral short, 1½ in head; ventrals moderate, with axillary scales; vertical fins without scales except the sheath at base; caudal deeply forked, nearly as long as head, the angles pointed. Color greenish, bluish-white below; snout yellowish; a broad band of green tinged with yellow from eye to tail; three similar bands on back, the median one most distinct and most regular; dorsals pale yellow; caudal dusky violet, the borders pale; pectoral rosy; ventrals and anal white. Cœca 5; air bladder very small. Length 8 inches. Havana (Poey.) Very rare, but occasionally visiting the coast of Cuba in great schools in December. (*vittatus*, striped.)

Inermia vittata, POEY, Memorias, II, 193, 1860, Havana.
Emmelichthys vittatus, POEY, Synopsis, 320, 1868.
Erythrichthys vittatus, POEY, Enumeratio, 49, 1875; JORDAN & FESLER, *l. c.*, 528, 1893.

Family CLIII. GERRIDÆ.

(THE MOJARRAS.)

Body oblong or elevated, compressed, covered with large, smooth scales; lateral line continuous, concurrent with the back; mouth moderate, extremely protractile, descending when protruded, the spines of the premaxillary extending to above eye, closing a deep groove in the top of head; maxillary without supplemental bone, not slipping under the very narrow preorbital, its surface silvery, like the rest of the head; base of mandible scaly, a slit between it and the preorbital to permit its free motion; both jaws with slender, villiform teeth; no incisors, canines, nor molars; no teeth on vomer or palatines; preopercle entire or serrate; sides of head scaly; nostrils double, round; pseudobranchiæ concealed; gill rakers short, broad; gill membranes separate, free from the isthmus; dorsal fin single, continuous or deeply notched, the spinous and soft portions about equally developed, with a scaly sheath along the base; dorsal spines usually 9 or 10; anal usually with 3 spines, the soft portion of the fin similar to the soft dorsal but shorter; ventral fins thoracic, I, 5, rather close together, slightly behind pectorals; branchiostegals 6; lower pharyngeal bones close together, often appearing to be united, the teeth blunt; air bladder present; pyloric cœca rudimentary; vertebræ 10+14=24. Oviparous. Genera 6 or 8; species about 40. Carnivorous fishes of moderate or small size inhabiting the tropical seas. They differ considerably in form and in development of spines, but the intergradations are very perfect, so that but for the osteological peculiarities of certain species all might be placed in one genus.* The larger species are used as food and are of excellent flavor. (*Gerridæ*, Günther, Cat. Fishes, IV, 252–264, 1862.)

a. Dorsal fin continuous, deeply notched.
    b. Second interhæmal spine singularly developed, as a hollow cylinder, comparatively short and much expanded, the posterior end of the air bladder entering its cavity; preopercle and preorbital entire; anal spines 3, the second not much enlarged. EUCINOSTOMUS, 559.

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*For descriptions and complete synonymy of the species of this family see paper by Evermann & Meek in Proc. Ac. Nat. Sci. Phila. 1886, 256–272.

bb. Second interhæmal spine normally developed, not hollow, the air bladder not entering it.
c. Second interhæmal spine very short, bluntish; anal spines 2, both small; preopercle and preorbital entire. ULÆMA, 560.
cc. Second interhæmal spine long, spear-shaped; anal spines 2 or 3, the second enlarged.
d. Preopercle entire; second anal spine moderate. XYSTÆMA, 561.
dd. Preopercle serrate; second anal spine much enlarged. GERRES, 562.

559. EUCINOSTOMUS, Baird & Girard.

(MOJARRITAS.)

Eucinostomus, BAIRD & GIRARD, Ninth Smith. Report 1855, 20 (*argenteus*).

Interhæmal bone of the second anal spine greatly modified, expanded into a hollow cylinder, into which the posterior end of the air bladder enters. Preopercle and preorbital entire; body comparatively elongate, subelliptical in form; anal spines 3; the second anal spine and fourth dorsal spine not greatly enlarged. Species numerous in warm seas, remarkable for the structure of the second interhæmal, which is formed somewhat as in *Calamus*, but much more modified than in the latter genus. (*εὖ*, well; *κινέω*, to move; *στόμα*, mouth.)

a. Premaxillary groove wholly naked, linear or semioval, sometimes constricted at base, but never scaled; anal rays III, 7.
b. Eye very large, its diameter much greater than length of snout, $2\frac{2}{3}$ in length of head. Exposed portion of maxillary small, triangular; premaxillary groove linear. DOWI, 1743.
bb. Eye moderate, usually more than 3 in head, its diameter about equal to length of snout. Exposed portion of maxillary triangular in front, oblong behind.
c. Body elongate, the back little elevated; greatest depth $3\frac{1}{4}$ to $3\frac{1}{2}$ in length. Anal spines small, the second $4\frac{1}{2}$ in length of head. PSEUDOGULA, 1744.
cc. Body more compressed, deeper, the back more elevated; greatest depth $2\frac{2}{3}$ in length.
d. Snout blunt; eye large, scarcely 3 in head; second anal spine large, $2\frac{2}{3}$ to $3\frac{1}{3}$ in head; premaxillary groove linear. HARENGULUS, 1745.
dd. Snout less blunt; eye not so large, more than 3 in head; second anal spine shorter, $3\frac{1}{4}$ to $4\frac{1}{2}$ in head; the premaxillary groove becoming broader with age, linear in the young; spinous dorsal black at tip, especially in the young. CALIFORNIENSIS, 1746.
aa. Premaxillary groove scaled in front, the scales leaving a naked pit behind. Depth $2\frac{5}{8}$ in length; head 3 to $3\frac{1}{5}$ in length of body. Second anal spine about $3\frac{1}{2}$ in head. GULA, 1747.

1743. EUCINOSTOMUS DOWI (Gill).

Head $3\frac{2}{5}$; depth 3; eye large, $2\frac{2}{3}$ in head; snout $3\frac{1}{2}$, and interorbital $3\frac{1}{6}$ in head; scales 5–45–10. Body rather slender, compressed, elliptical, back little elevated, head flat, with a slight depression above front of orbit. Maxillary triangular and small, the width at the posterior end being $\frac{1}{2}$ the length, which is about $\frac{1}{2}$ diameter of eye, also $\frac{1}{2}$ length of second dorsal spine. Preorbital and preopercle entire. Second and third dorsal spines about equal, the third, perhaps, slightly longer, $1\frac{3}{4}$ in head, all weak and flexible. Second anal spine relatively strong, third weaker, but slightly longer, $2\frac{3}{4}$; base of anal $1\frac{7}{8}$ to $2\frac{1}{8}$ in length of head; least depth of caudal peduncle 2⅔ in head; pectorals about ⅞ length of head, their tips reaching vent; ventrals 1⅗ in head, reaching about ⅘ distance to vent. Premaxillary groove narrow, usually linear and naked, and not extending quite to the vertical of center of pupil. Color silvery, with bluish reflections, darker above lateral line; tips of spinous dorsal black; ventrals dusky; a black supraorbital spot; caudal dusky; body covered with very fine dark punctulations. Length 3 to 6 inches. The specimens here described from Panama. Pacific coast of tropical America; Galapagos Islands; Panama. Specimens very similar have been taken at Key West and Havana, but these may be referable to *Eucinostomus harengulus*. (Named for Capt. John M. Dow.)

Diapterus dowi, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 162, Panama. (Coll. Dow.)
Gerres dowi, EVERMANN & MEEK, in part, *l. c.*, 259.

1744. EUCINOSTOMUS PSEUDOGULA, Poey.

Head 3¼ to 3½; depth 3¼; eye 3⅕ in head; snout 3¼; interorbital width 3⅖. D. IX, 10; A. III, 7; scales 5–49–9. Body elongate, elliptical, not much compressed; back little elevated; profile evenly convex; top of head little convex; mouth rather small, end of maxillary reaching slightly past vertical from front of orbit; length of maxillary 3¼ in length of head, its exposed portion nearly triangular and about ⅕ length of head, its greatest width ½ its greatest length; preorbital and preopercle entire; snout not much pointed, conical; cheeks each with 3 rows of scales; 7 gill rakers below the angle. Dorsal spines all weak and flexible; second and third subequal, 1⅓ in length of head; base of anal 2 in length of head, spines small, the second the stronger, its length 4½ in length of head, about equal in length to third spine or slightly shorter; least depth of caudal peduncle 3 in length of head; tips of pectoral fins reaching vent, their length about 3⅖ in length of body; ventrals 1½ in head, their tips reaching ¾ distance to vent; premaxillary groove long, linear and free from scales. Color greenish above, with bluish reflections, silvery below; snout blackish; tips of spinous dorsal black; pectorals pale; dusky in axil; ventrals and anal pale; caudal reddish. Length 2¾ to 7 inches. Here described from specimens from Havana. West Indies to Brazil, not rare; Bermudas; Cuba; St. Lucia; Bahia. (*ψεῦδης*, false; *gula*.)

Eucinostomus pseudogula, POEY, Enumeratio, 53, pl. 1, 1875, Havana.
Gerres jonesi, GÜNTHER, Ann. Mag. Nat. Hist., III, 1879, 150 and 389, Bermudas.
Gerres pseudogula, EVERMANN & MEEK, *l. c.*, 260.

1745. EUCINOSTOMUS HARENGULUS, Goode & Bean.

Head 3⅓ to 3½; depth 3 to 3⅕. D. IX, 10; A. III, 7; P. 15; V. I, 5; C. +17+. Scales 5–44–10; diameter of eye exceeding length of snout, 3 times in the length of the head, and equaling width of interorbital space; the groove for the processes of the intermaxillaries naked; gill rakers small, about 4 + 7; free portion of tail longer than high; least height of tail equaling length of sixth dorsal spine; third dorsal spine longest, its length twice in height of body and equaling length of head without postorbital portion; last dorsal spine equaling length of second anal, about equaling length of snout, and about ⅖ as long as the third; first dorsal ray fully 1½ times as long as first dorsal spine; second anal spine stronger and shorter than third, its length 3⅖ in length of head; third anal spine contained 3⅓ times in length of head; caudal forked, its length slightly less than length of head, and very little greater than length of pectoral; the pectoral reaching to the perpendicular through origin of soft dorsal; ventral half as long as head; vent under the second ray of the soft dorsal. The back with a slight tawny hue, interrupted as it blends with the white of the sides by 5 or 6 indistinct scollopy incursions of the body color, giving the upper part of the side of the fish a marbled appearance. (Goode & Bean.) Atlantic coast of tropical America, common; known from western Florida, Key West, Jamaica, Santo Domingo and Bahia. (diminutive of *harengus*, herring.)

Eucinostomus harengulus, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 132, West Florida. (Type, No. 5145, U. S. N. M. Coll. Kaiser & Martin.)
Gerres harengulus,* JORDAN & GILBERT, Synopsis, 584.

1746. EUCINOSTOMUS CALIFORNIENSIS (Gill).

(MOJARRA CANTILEÑA.)

Head 3⅓; depth 2⅓ to 2⅘; eye not very large, its diameter 3⅕ in head; snout 3½ in head. Dorsal IX, 10; A. III, 7. Scales 5–45–9. Body elliptical, compressed, back moderately elevated; anterior profile little convex, not very steep; snout rather pointed, mouth moderate, maxillary reaching almost to vertical from front of orbit, its length 3 in length of head; exposed portion of maxillary triangular in front, oblong behind, its width 2 in its length, which is 4¾ in length of head; preorbital and preopercle entire; premaxillary groove long, linear and naked in young specimens (*gracilis*), becoming in older examples (*californiensis*) more or less oval and sometimes forming a rounded pit. In the cranium the groove is always linear, this variation being due to changes in the flesh and skin. Gill rakers small and weak, 7 below the angle. Dorsal spines weak and flexible, the longest 4¾ to 2⅒ in head; ventral fins short, their tips reaching about halfway to anal, their length 1⅔ in head; pectorals slender, their tips reaching beyond vent; length of pectorals about equal to head; ventrals and caudal mostly covered with small scales; other fins naked. Color in life silvery, greenish above; snout and upper part of caudal dusky; spinous dorsal punctate at base, usually abruptly black at tip, especially in the young; the dark areas separated by a transparent horizontal bar, these markings wanting in some specimens, perhaps females; soft dorsal punctate; caudal with a faint dusky margin; ventrals pale.

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* In the paper on this genus by Evermann & Meek (Proc. Ac. Nat. Sci. Phila. 1886, 261), *Gerres harengulus*, as represented by specimens from Florida and Cuba, was referred to the synonymy of the west coast *Eucinostomus gracilis* (*californiensis*). The two species are very closely related. A comparison of specimens shows that *harengulus* has a blunter snout, somewhat larger eye, and larger anal spines than *californiensis*. Eye 2⅕ in head; snout 3¾; second anal spine 2⅔ to 3⅓ in head in *harengulus* from Key West (3¼, 3¼, 4½ in *californiensis* from Guaymas). It is, however, not always possible to distinguish *harengulus*, *pseudogula*, *gracilis*, *californiensis* and *dowi*, and perhaps all may prove to be varieties of one, *E. californiensis*.

Length 3 to 8 inches. Pacific coast of Mexico; excessively common in shallow bays, and entering streams; known from Guaymas and Cape San Lucas to Panama; once taken at San Diego.

Diapterus californiensis,* GILL, Proc. Ac. Nat. Sci. Phila. 1862, 245, Cape San Lucas. (Coll. Xantus.)

Diapterus gracilis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 246, Cape San Lucas. (Coll. Xantus.)

Gerres cinereus,† var. nov., EIGENMANN & EIGENMANN, Amer. Naturalist, Feb., 1891, 155, San Diego. (Coll. Eigenmann.)

Gerres gracilis, EVERMANN & MEEK, *l. c.*, 261.

Gerres californiensis, EVERMANN & MEEK, *l. c.*, 263.

Eucinostomus californiensis, ‡ JORDAN, Proc. Cal. Ac. Sci. 1895, 469.

1747. EUCINOSTOMUS GULA (Cuvier & Valenciennes).

(SILVER JENNY; MOJARRA DE LEY; PETITE GUEULE.)

Head $3\frac{1}{3}$; depth $2\frac{2}{5}$; eye 3 in head; snout $3\frac{1}{2}$; interorbital width 3. D. IX, 10; A. III, 8; scales 5–42–9. Body elliptical, compressed, back moderately elevated, mouth small; end of maxillary reaching slightly past vertical from front margin of orbit; exposed portion of maxillary nearly oblong, its width about 2 in its length, which is from 4 to 5 in the length of the head; preorbital and preopercle entire. Gill rakers small and weak, 7 below the angle; premaxillary groove scaled in front, the posterior part naked, forming a sort of pit; longest dorsal spine $1\frac{1}{2}$ in head; second anal spine shorter and stronger than third, its length about $3\frac{1}{3}$ in head; ventrals reaching nearly to vent, their length $1\frac{2}{5}$ in length of head; pectorals reaching front of anal, their length about 3 in length of body. Second interhæmal hollow and enlarged. Color silvery, greenish, darker above; no distinct longitudinal lines except in very young; upper margin of spinous dorsal more or less black; dorsal and anal fins dusky, other fins pale. The form of this species resembles that of *Eucinostomus californiensis,* but the body is always less elongate than in the latter. The form of its premaxillary groove, differing from that of any other species, affords the best character for distinction. Carolina to Brazil, the young ranging north to Woods Hole; excessively common everywhere in shallow water and on sandy shores, as is its congener *californiensis* in the Pacific. It reaches a length of 4 or 5 inches, and is used only for bait. The only species ranging far northward. (*gula,* throat; from the common name *Petite gueule* at Martinique.)

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* The following is the substance of Dr. Gill's description of *E. californiensis:*
Head $3\frac{1}{3}$; depth $2\frac{1}{3}$ in young. D. IX, 10; A. III, 8. Scales 6–44–13. Caudal peduncle slender and attenuated at middle. The diameter of eye $2\frac{2}{3}$ times (.09) in head; snout $3\frac{1}{3}$. Interorbital area flattened, groove for the posterior processes of premaxillaries broad, scaleless, semioval, and reaching vertical of ends of maxillaries, exposed portions of maxillaries convex above, semicordate, twice as long as broad. Lateral line sigmoidally curved. Second and third dorsal spines nearly equal, $5\frac{1}{2}$ in body, $1\frac{7}{8}$ in head, nearly twice as long as last spine. Third anal spine larger than second, shorter than last dorsal one, and 4 in head. Caudal $\frac{1}{3}$ longer than head, equaling pectorals, and twice as long as ventrals. Color silvery, with steel-blue reflections above; the fins immaculate. (Gill.)

† A specimen taken at San Diego and recorded by Dr. Eigenmann as "*Gerres cinereus*, var. nov.," seems to belong to *Eucinostomus californiensis*. Head $3\frac{2}{5}$; depth $2\frac{2}{3}$; scales 6–45–10; eye equal to interorbital space, 5 in head; maxillary just reaching front of eye; predorsal distance $2\frac{1}{2}$ in length; caudal fin slightly longer than head, second anal spine short, about $3\frac{1}{2}$ in head; ventral fins $1\frac{1}{2}$ in head. Dark punctulations everywhere, except on ventral surface; no dark lateral bars; upper portion of spinous dorsal fin blackish; all the fins finely punctate, the pectorals least so; a dark-blue axillary spot. Length about 7 inches. San Diego. (Eigenmann.)

‡ "*Eucinostomus californiensis* is generally common along the west coast of Mexico, from Guaymas to Panama. It is probably, however, not found in the West Indies, the closely related *Eucinostomus harengulus* being apparently a different species. The specimens called *californiensis* by Gill, having the premaxillary groove semioval or U-shaped, seem to represent the adult of this species. Those called *gracilis*, with the premaxillary groove linear, are the young or half grown. Still others, especially adults, have the premaxillary groove round, forming a pit, and every intermediate character may be found. At first we thought it possible to separate *californiensis* and *gracilis* as distinct species. The careful reexamination of some 200 specimens leaves us wholly unable to separate them, as all grades of variation occur. Apparently the premaxillary groove is linear in the young, growing broader with age, but the changes very irregular. The name *Eucinostomus californiensis* has priority over *E. gracilis*". (Jordan.)

Gerres gula, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 464, 1830, Martinique; GÜNTHER, Cat. Fishes, I, 346, 1859, and IV, 255, 1862; EVERMANN & MEEK, *l. c.*, 264.
Eucinostomus argenteus, BAIRD & GIRARD, Ninth Smith. Report 1855, 345, Beesley Point, New Jersey. (Coll. Baird.)
Eucinostomus gulula, POEY, Enumeratio, 54, pl. 2, 1875, Havana.
Diapterus homonymus, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 340, Clearwater Harbor, Florida. (Type, No. 23639. Coll. Dr. Velie.)
Gerres argenteus and *homonymus*, JORDAN & GILBERT, Synopsis, 584.

560. ULÆMA, Jordan & Evermann.

Ulæma, JORDAN & EVERMANN, Proc. Cal. Ac. Sci. 1895, 471 (*lefroyi*).

This genus is close to *Eucinostomus,* from which it differs in the form of the second interhæmal, which is short, bluntish, and not hollowed out. The single known species is slender in form, with weak spines, the anal fin having but 2. (*οὐλός*; entire; *αἷμα,* blood, for interhæmal, the interhæmal being entire and not cup-shaped at its upper end.)

1748. ULÆMA LEFROYI (Goode).

Head 3⅓ to 3½; depth 3⅗; eye large, 2¾ in head; snout 3½; interorbital width 3; scales 5-47-9. D. IX, 10. A. II, 8. Body elongate, elliptical, not very strongly compressed; back little elevated; snout conical, not much pointed; mouth small, end of maxillary reaching scarcely beyond vertical from anterior margin of orbit, its length 3 in length of head, exposed portion nearly triangular, its greatest width 2 in its length, which is 5 in length of head; top of head flattish; premaxillary groove long, linear and naked; gill rakers weak, small, 7 or 8 below the angle; dorsal spines all weak and flexible, second and third subequal, ½ in length of head, upper margin of the fin concave; second anal spine moderate, its length 4 in head; least depth of caudal peduncle 3⅔ in length of head. Color silvery, darker above, everywhere with fine dusky punctulations and traces of cross bars; top of spinous dorsal black; dorsal, anal, and caudal dusky; ventrals and pectorals paler, but with dusky punctulations; axil dusky; a dark spot on supraorbital; snout dusky; no distinct stripes along rows of scales. Length 2 to 8 inches. Well distinguished from *Eucinostomus pseudogula* and other related species by the presence of but 2 anal spines, a character which reappears in the very different species, *Gerres rhombeus.* A much more marked character, however, is found in the small, solid interhæmal, which is wholly unlike that of *Eucinostomus.* West Indies, on sandy shores, north to Cedar Keys; known from the Bermudas, Cuba, Key

West, and Cedar Keys. (Named for "Maj. Gen. J. H. Lefroy, F. R. S., governor of the Bermudas, a gentleman of well-known scientific attainments and reputation, who while doing so much for the social and political welfare of the islands is also taking an active part in the development of the Natural History." Goode.)

Diapterus lefroyi, GOODE, Amer. Jour. Sci. and Arts 1874, 123, Bermudas; EVERMANN & MEEK, Proc. Ac. Nat. Sci. Phila. 1886, 259.

Eucinostomus productus, POEY, Enumeratio, 55, 1875; and Ann. Lyc. Nat. Hist. N. Y. 1876, Havana.

Eucinostomus lefroyi, GOODE, Bull. U. S. Nat. Mus., v, 39, 1876.

561. XYSTÆMA, Jordan & Evermann.

(MOJARRAS BLANCAS.)

Xystæma, JORDAN & EVERMANN, Proc. Cal. Ac. Sci. 1895, 471 (*cinereus*).

This genus differs from *Gerres* in having the preopercle entire. The body is compressed, but not greatly elevated, and the second anal and fourth dorsal spines are less enlarged than in *Gerres*. The second interhæmal is long and spear-shaped, not hollow, and not receiving the air bladder, its structure as in *Gerres*. One species, widely distributed. (*ξυστόν*, shaft of a spear; *αἷμα*, blood, for interhæmal.)

1749. XYSTÆMA CINEREUM (Walbaum).

(MOJARRA DE CASTA; MOJARRA BLANCA; BROAD SHAD.)

Head 3⅓; depth 2⅓ to 2⅗; eye about 3⅕ in head; snout 3¼; interorbital width 3⅕; scales 6-45-10. Body compressed, elongate, back moderately elevated, the dorsal profile being evenly convex; mouth moderate, the maxillary extending but slightly beyond the vertical at anterior margin of orbit, its exposed portion triangular in form and twice as long as wide, its length being contained five times in that of the head; preorbital and preopercle entire; premaxillary groove broad and free from scales; gill rakers weak, 7 below the angle; distance from end of snout to dorsal fin 2⅕ in length of body; second dorsal spine longest, about 1½ in head and not much stronger than the others; all the dorsal spines are weak and flexible; general outline of the upper margin of the spinous dorsal falcate; second and third anal spines subequal, second 2⅔ to 2¾ in length of head, the pectorals scarcely reaching anal, their length being contained 3 times in that of body; ventrals contained 1⅖ times in head, and scarcely reaching the vent. Color silvery, with bluish reflections above; sides with 7 or 8 broken, bluish vertical bars, about equaling pupil in width, most distinct in life, and present at all ages; no dark stripes along scales; dorsal and caudal fins dusky; other fins pale; ventrals with a few dark punctulations; axil dark; eye white; spinous dorsal and ventrals golden in life. Length 12 to 15 inches. Both coasts of tropical America, and the West Indies, north to southern Florida and Lower California; generally common in waters of moderate depth; entering rivers; a good fish of considerable importance, being much larger in size than species of *Gerres*.

Known from Havana; Jamaica; Martinique; Bahamas; Barbados; Florida Keys; Mazatlan; Rio Presidio; Guatemala; Panama; Chiapas. (*cinereus*, ashy gray.)

Turdus cinereus peltatus (the Shad), CATESBY, Nat. Hist. Carolinas, etc., 1731, Bahamas.
Mugil cinereus, WALBAUM, Artedi Piscium, 228, 1792, Bahamas; after CATESBY.
Gerres aprion, CUVIER, Règne Animal, Ed. 2, II, 104, 1829; based on CATESBY; CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 461, 1830.
Gerres zebra, MÜLLER & TROSCHEL, Schomburgk, Hist. Barbados, 668, 1848, Barbados; GÜNTHER, Cat. Fishes, IV, 254, 1862.
Gerres squamipinnis, GÜNTHER, Cat. Fishes, I, 349, 1859, Jamaica; Guatemala. (Coll. Dr. Parnell and Mr. Frank.)

562. GERRES, Cuvier.

(MOJARRAS.)

Gerres,* CUVIER, Règne Anim., Ed. 2, II, 104, 1829 (*lineatus*, etc.).
Diapterus, RANZANI, Nov. Comment. Bonon., V, 1841, 340 (*auratus*).
Catochænum, CANTOR, Cat. Malayan Fishes, 55, 1850 (*lineatus*, etc.); substitute for *Gerres*, CUVIER, regarded by CANTOR as preoccupied by *Gerris*, FABRICIUS, 1794, a genus of insects.
Moharra, POEY, Enumeratio, 50, 1875 (*rhombea*).

Second interhæmal long and spear-shaped, not excavated and not receiving the end of the air bladder; preopercle serrate; body elevated and more or less rhomboid in form, the third or fourth dorsal spine and the second anal spine more or less elevated. Species numerous. (*Gerres*, an old name used by Pliny for some fish, perhaps a *Spicara*. "Fuisse *Gerres* aut inutiles Mænas. Odor impudicus urcei satebatur.")

a. Preorbital entire; no distinct dark streaks along the rows of scales.
MOHARRA (Mojarra, Spanish name, from *muger*, Latin *mulier*, woman).
    b. Anal spines 2 only, the soft rays 9; second dorsal spine about 3 in head; second anal spine 1¾; premaxillary groove broad, scaleless; body deep. RHOMBEUS, 1750.
DIAPTERUS (διά, divided, πτέρον, fin):
    bb. Anal spines 3, soft rays 8.
        c. Premaxillary groove broad, triangular or oval, and free from scales.
            d. Body ovate, the outline somewhat regularly elliptical, depth 2¼ in length. Dorsal spines slender, but little flexible, the second scarcely stronger than the third, 2 in length of head. Second and third anal spines subequal, 2⅗ in length of head, second stronger than third. AUREOLUS, 1751.

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* The genus *Gerres* was established by Cuvier in the second edition of the Règne Animal, the name being based on 7 species as enumerated by him, *rhombeus*, *oyena*, *aprion*, *poieti*, *lineatus*, *argyreus*, and *filamentosus*. One of these species must, therefore, be chosen as the type of *Gerres*. In 1842 Ranzani established the genus *Diapterus* on *auratus*, a species closely related to *rhombeus*, or rather to the allied *olisthostoma*. In 1850 the name *Catochænum* was proposed by Cantor as a substitute for *Gerres*, regarded as preoccupied by the earlier name *Gerris*, applied by Fabricius to a genus of insects. The name *Catochænum* can only be used if *Gerres* is regarded as ineligible. By the rules followed by us, *Gerres* must be retained, being spelled differently from *Gerris*. In different publications of Poey, *plumieri* is made the type of *Gerres*, although it is not one of Cuvier's original species. Bleeker substitutes *Diapterus* for *Gerres* and *Catochænum*, specifying *plumieri* as its type, while Gill and Poey have used the name *Diapterus* for the allies of *gula*, to which the name *Eucinostomus* has been applied in 1855 by Baird and Girard. Although *plumieri* can not be made the type of *Gerres*, it seems to us that the cognate species *lineatus* can be so regarded. If this view is adopted, the restricted *Gerres* of the present work would correspond exactly with the restricted *Gerres* of Poey and Gill. This fact certainly justifies us in choosing *lineatus* as the type of the genus.

dd. Body rhomboidal, short and deep, with angular outlines, the depth usually more than ½ length; spines long and slender; second dorsal spine ¾ or more length of head; second anal spine more than ½ length of head. PERUVIANUS, 1752.

cc. Premaxillary groove broad, oval, and covered with scales (these sometimes deciduous in poorly preserved specimens). Anal rays III, 8; second dorsal spine 1¼ in head; second anal spine 1⅜ in head; teeth rather long and slender. OLISTHOSTOMUS, 1753.

GERRES:

aa. Preorbital serrate; a distinct dark streak along each row of scales on back and sides; body rhomboidal, with angular outlines; spines very strong; anal rays III, 8 or 9-

e. Scales moderate or large, 34 to 39 in lateral line.

f. Spines moderate, the second dorsal spine ⅔ to ¾ length of head.

g. Pectorals short, barely reaching vent; second dorsal spine 1⅔ in head; caudal shorter than head; lateral stripes few; depth about 2⅗ in length; 39 scales in lateral line. BREVIMANUS, 1754.

gg. Pectorals long, about as long as head; caudal longer than head; sides with numerous dark streaks along the rows of scales; body deep, the back elevated, the depth 2 to 2¼ in length; dorsal and ventrals more or less dusky.

h. Pectorals as long as head, not reaching front of anal, 3 to 3⅓ in body; scales 38; longest dorsal spine 1⅖ in head.

i. Third dorsal spine rather longer than second; 10 rows of scales between lateral line and vent; opercle with few if any small scales at base. LINEATUS, 1755.

ii. Third dorsal spine not longer than second; 11 rows of scales between lateral line and vent; opercle with numerous small scales at base. BRASILIANUS, 1756.

hh. Pectorals very long, ⅙ longer than head, 2½ to 2¾ in body; second dorsal spine longest, 1½ in head; scales 35. EMBRYX, 1757.

ff. Spines very high, the second dorsal spine longer than head; second anal spine about equal to length of head; lateral stripes very distinct, about 12 in number; depth of body 2⅙ in length; pectorals very long, 2⅔ in body; scales 37. PLUMIERI, 1758.

ee. Scales small, 44 in lateral line. Second dorsal spine about as long as head; depth of body 2½ in length; lateral stripes faint. MEXICANUS, 1759.

Subgenus **MOHARRA**, Poey.

1750. **GERRES RHOMBEUS**, Cuvier & Valenciennes.

Head 3¼; depth 1⅚; eye 3¼ in head; snout 4; interorbital width 3¼; scales 5–38–10. D. IX, 10; A. II, 9. Body much compressed, rhomboidal in form, the back much elevated; profile evenly convex to supraorbital, where there is a slight depression; snout somewhat pointed; mouth rather large; end of maxillary reaching to vertical from center of pupil, its length 3 in head; exposed portion of maxillary oblong, its width about 2¾ in its length, which is 4¼ in head; gill rakers stronger than in *gula* or *olisthostomus*, 18 below angle; premaxillary groove broad, oval, and free from scales; pectoral fins reaching to front of anal, their length 3 in length of body; ventral fins reaching beyond vent, their length 4¼ in length of body; second dorsal spine stronger, but shorter than third and fourth, its length about 4¼ in length of body; margin of fin falcate; suborbital entire; preopercle entire; caudal peduncle 2⅔ in length of head; anal spines constantly 2 in number, the second 1¾ in length of head. Color silvery, with bluish reflections, darker above; margin of dorsal fin black; fins rather pale; ventrals and anal with dusky punctulations; snout dusky; no distinct dark lines along the rows of scales. Length 8 to 10 inches. West Indies and Atlantic coast of tropical America; generally common; known from Jamaica, San Domingo, Martinique, Puerto Cabello, Havana, Aspinwall, Rio Magdalena, Santa Lucia and Bahia. Easily known by the presence of but 2 anal spines. (*rhombeus*, rhombic.)

Gerres rhombeus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 459, 1830, Martinique; San Domingo; GÜNTHER, Cat. Fishes, I, 341, and IV, 253; EVERMANN & MEEK, *l. c.*, 266.

Subgenus DIAPTERUS,* Ranzani.

1751. GERRES AUREOLUS, Jordan & Gilbert.

Head 3; depth 2¼; eye 3¼ in head. D. IX, 10; A. III, 8; scales 35. Body ovate, much compressed, the back elevated, the outlines nearly regular; outline along base of anal very oblique; caudal peduncle very short and deep, tapering regularly to base of tail; snout rather pointed, projecting, the interorbital area strongly depressed; maxillary long, reaching to a point midway between front and middle of pupil, the exposed portion narrowly oblong, its width about ⅖ its length; teeth slender, in narrow bands; groove on top of head for premaxillaries scaleless, triangular, reaching a point opposite middle of eye, its width in front ⅔ its length. Eye very large, its diameter greater than snout or than interorbital width. Preopercle with angle produced, the margin sharply and finely serrated. Gill rakers very short, not ⅓ diameter of pupil. Scales moderate, in about 4 rows on the cheek; lateral line running high, but little arched much above axis of body, even on caudal peduncle. Dorsal spines slender, but little flexible, the second scarcely stronger than the others, about as long as the third, ½ as long as head; dorsal fins separate, notched to the base, the upper outline of spinous portion very oblique; caudal deeply forked; anal low, the second spine a little longer and noticeably stronger than the third, 2⅖ in head; soft rays posteriorly not rising above their basal sheath of scales; ventrals reaching well past vent, their length more than ½ head; pectorals long, as long as head, reaching slightly beyond origin of anal. Color in life, light olivaceous above, silvery below; sides with distinct tinge of pale yellow; fins all yellowish; vertical fins margined with black, the spinous dorsal with a jet-black blotch on tip of membrane of anterior spines; membrane of each spine and ray of the dorsal with a distinct jet-black spot at its base; ventrals yellow on terminal portion of outer rays only, the very tip of these white; tip of snout dark; opercular membrane yellowish above; lips with some yellow. Panama; only the original type, $5\frac{1}{4}$ inches long, known. (*aureolus*, gilded.)

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* *Diapterus* is thus defined by Ranzani:

"Caput breve frons basi concava, rostrum attenuatum. Dentes maxillares minutissimi, atque confertissimi; Membrana branchiostegia septem radiis fulcita. Corpus valde compressum et elevatum. Secunda pinna dorsalis, nec analis in pinnulas divisa.

Hujus generis una tantum species adhuc mihi innotuit, quam appelavi *Diapterum auratum*, ejusque imaginem verbis nunc exprimere conabor."

Gerres aureolus, JORDAN & GILBERT, Bull. I, U. S. Fish Comm. 1881 (1882), 328, Panama (Coll. C. H. Gilbert); EVERMANN & MEEK, *l. c.*, 266.

1752. GERRES PERUVIANUS, Cuvier & Valenciennes.

(MOJARRA DE LAS ALETAS AMARILLAS.)

Head 3; depth $2\frac{1}{5}$. D. IX, 10; A. III, 8; eye 3 in head, snout slightly shorter; pectoral equaling head; ventrals $1\frac{1}{4}$; second dorsal spine $1\frac{1}{10}$; second anal spine $1\frac{1}{2}$. Body rhomboidal, short and deep, with angular outlines, the depth usually about half length; preopercle finely serrate; edge of preorbital entire; spines long and slender; second dorsal spine, when depressed, reaching to the base of the third or fourth dorsal ray; posterior outline of spinous dorsal deeply concave; pectoral long and falcate, reaching past front of anal; second and third anal spines about equal in length, longer than the soft rays, and when depressed, reaching past tip of last ray; ventral spine reaching vent, the rays reaching midway between vent and anal spines. Premaxillary groove broad, triangular or oval, and free from scales. Color silvery, without dark streaks or bars; fins pale; caudal and anal yellow. Pacific coast of tropical America; very common; known from Mazatlan, Salina Cruz, Chiapas, Panama, Payta, and Guayaquil. Length 5 to 8 inches.

Gerres peruvianus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 467, 1830, Payta, Northern Peru; EVERMANN & MEEK, *l. c.*, 266.

Gerres brevirostris,* SAUVAGE, Bull. Soc. Philom. Paris, III, 1879, 208, Rio Guayas, Equador. (Coll. André.)

1753. GERRES OLISTHOSTOMUS,† Goode & Bean.

(IRISH POMPANO; MUTTON FISH.)

Head 3; depth 2. D. IX, 10; A. III, 8; scales 5–37–9. Body rhomboid, short and deep, the back elevated, the anterior profile short and very steep; mouth rather large; teeth slender, brush-like; preorbital entire; preopercle and interopercle serrate; groove on top of head, for reception of premaxillaries broad, rounded behind, with a median linear depression, its surface completely covered with small deciduous scales which extend forward to just behind nostrils. Eye moderate. Gill rakers small, about 14 on lower part of arch. Dorsal spines high and strong, the second nearly or quite as long as head; second anal spine very strong, ½ or more length of head; third spine slightly longer than second and very slender; caudal lobes long and slender, a little longer than head; pectoral long, nearly as long as head, reaching front of anal. Color silvery olivaceous; scales with faint silvery streaks, but no dark ones; fins mostly pale or yellowish, the ventrals somewhat dusky. Length 12 inches. West Indies, north to southern Florida, south to Brazil; rather common; much resembling *Gerres rhombeus*, with which it has been confounded, but that species has always 2 anal spines and the premaxillary groove entirely naked. (*ὄλισθος*, slipperiness; *στόμα*, mouth, from the protractile jaws.)

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* *Gerres brevirostris* is thus described:

"D. IX, 10; A. III, 8; L. lat. 40; L. trans. $\frac{5}{11}$. Hauteur du corps contenue deux fois dans la longueur, caudale non comprise; longueur de la tête trois fois et demi dans la même dimension. Ligne rostro-dorsale très-inclinée, comme dans la *Gerres plumieri*. Museau obtus, plus court que l'œil, dont le diamètre est compris trois fois dans la longueur de la tête; espace interorbitaire moins large que l'œil. Processus de l'intermaxillaire dépourvu d'écailles et se prolongeant presque jusqu'au niveau du bord postérieur de l'œil. Deuxième et troisième épines dorsales de même hauteur, aussi hautes que la distance qui sépare l'extrémité du museau du bord du preopercule, ayant la moitié de la hauteur du corps. Deuxième et troisième épines anales presque de même hauteur, plus courtes que la seconde épine dorsale. Caudale fortement échancrée. Pectorales arrivant presque à l'anale. Coloration uniforme. Voisine du *Gerres rhombeus*, cette espèce s'en distingue par le profil rostro-dorsal encore plus incliné et par la position de l'œil, entamant cette ligne rostrale. Rio Guayas (Equateur): André." (Sauvage.)

† Very close to *Gerres olisthostomus* is the species described from Brazil under the name of *Diapterus auratus*. Ranzani's figure shows a long-pointed snout, longer than eye; back elevated; head $3\frac{1}{4}$; depth 2; eye in head $3\frac{2}{5}$; second dorsal spine $1\frac{1}{3}$; second anal spine $2\frac{1}{3}$, shorter than third; pectoral reaching second anal spine, slightly longer than head; caudal slightly shorter than head; scales 41. D. IX, 10; A. III, 8.

Gerres olisthostoma, GOODE & BEAN, Proc. U. S. Nat. Mus. 1882, 423, Indian River, Florida (Type, No. 25118. Coll. R. E. Earll); EVERMANN & MEEK, *l. c.*, 267; EVERMANN & BEAN, Fishes of Indian River, in Senate Doc. 46, 54th Congress, 2d session, 23, 1897.

Subgenus GERRES.

1754. GERRES BREVIMANUS, Günther.

Head 3¼; depth 2⅓; eye 3⅓ in head. D. IX, 10; A. III, 8. Scales 6–39–11. Back much lower than in *G. lineatus*, and the pectoral fins very much shorter, their length 1¼ in head; caudal 3 in body; frontal groove broad and naked; preorbital very little serrate, almost entire; preopercle weakly serrate; second dorsal spine 1⅖ in head; second anal spine 1⅔; teeth small and short. Coloration of *G. lineatus*, the dark streaks fainter; no black on base of pectoral, or on lower fins; spinous dorsal dusky above. (Günther.) Pacific coast of Mexico; only the original type from Chiapas known. (*brevis*, short; *manus*, hand.)

Gerres brevimanus, GÜNTHER, Proc. Zool. Soc. London 1864, 152, Chiapas; EVERMANN & MEEK, *l. c.*, 270.

1755. GERRES LINEATUS (Humboldt).

(MOJARRA CHINA.)

Head 3¼; depth 2¼. D. IX, 10; A. III, 8; scales 5–34–10; eye 3⅓ in head; snout 3¾; pectoral ⅒ longer than head; ventrals 1⅓; second dorsal spine 1¼; second anal spine 1½. Preorbital finely serrated; snout scarcely as long as the eye; groove for the premaxillary processes very broad, scaleless, extending backward to the vertical from the center of the eye; opercle with 3 or 4 rows of large scales, few or no small scales along its anterior edge; dorsal fin notched, the last spine being not much longer than the eye; dorsal spines strong, the second as long as the head without snout, third spine usually a little longer than the second of the dorsal fin; second and third anal spines about equal in length, longer than the soft rays and reaching to the end of last ray when depressed; the pectoral extending to the vertical from the first anal spine; caudal deeply forked, with the lobes equal in length to each other and to the pectoral. A blackish streak along each series of scales; the hinder side of the axil, and sometimes the interior, blackish; ventrals more or less dusky. Length 8 to 12 inches. (*lineatus*, streaked.) West Coast of Mexico; a food-fish of some importance; generally common; known from Mazatlan, Acapulco, San Blas, and Chiapas.

Smaris lineatus, HUMBOLDT, Observ. Zool., II, 185, pl. 46, 1807-1834, Acapulco. (Coll. Alex. von Humboldt.)
Gerres axillaris, GÜNTHER, Proc. Zool. Soc. London 1864, 102, Chiapas.
Gerres lineatus, EVERMANN & MEEK, *l. c.*, 269.

1756. GERRES BRASILIANUS, Cuvier & Valenciennes.

(PATAO.)

Head $3\frac{3}{7}$; depth $2\frac{1}{5}$; eye small, $3\frac{2}{3}$ in head; snout $3\frac{1}{2}$. D. IX, 10; A. III, 7 or 8; scales 5-38-11. Body compressed, rhomboidal, back very much elevated; profile nearly straight from spinous dorsal to premaxillary groove, where there is a slight depression; snout conical, bluntish; less acute than in *G. lineatus;* mouth rather large; maxillary reaching slightly beyond the vertical from anterior margin of pupil, its length $2\frac{4}{5}$ in length of head; exposed portion of maxillary oblong, its width $2\frac{1}{2}$ in its length, its length $4\frac{1}{2}$ in length of head; preorbital and preopercle serrate; premaxillary groove broad, narrowed posteriorly, entirely free from scales; opercle with 4 or 5 rows of scales besides numerous small ones at its anterior edge; gill rakers short and weak, 11 below the angle; dorsal spines rather strong and stiff, second and third subequal in length, the second much the stronger, at least not longer than third, its length $1\frac{2}{5}$ in length of head; upper margin of dorsal fin falcate; second and third anal spines subequal, the second much the stronger, its length $1\frac{2}{3}$ in length of head; least depth of caudal peduncle $2\frac{1}{5}$ in length of head; pectoral as long as head, not nearly reaching front of anal, 3 to $3\frac{1}{3}$ in body. Color silvery gray, with bluish reflections, darker above, a dark streak along each row of scales, most conspicuous on upper part of body; fins all dusky except pectorals, which are pale; dorsal and anal blackish on their margins; a dark supraorbital spot; axil dusky; ventrals more or less dusky. Length a foot. Cuba to Bahia, generally common; here described from a specimen from Havana. The species is extremely close to *G. lineatus* and is doubtfully distinct. On comparison of specimens we note no difference except those mentioned in the analysis of species, and these are probably not constant.

Gerres brasilianus,* CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 458, 1830, Brazil; Porto Rico; EVERMANN & MEEK, *l. c.*, 268; JORDAN, Proc. U. S. Nat. Mus. 1890, 321.
Gerres patao, POEY, Memorias, II, 320, 1868, Havana.

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* A specimen from Brazil, typical of *Gerres brasilianus*, shows the following characters: Eye $3\frac{1}{3}$ in head; second dorsal spine about $1\frac{2}{5}$ in head. Ventral not black, but dusky shaded; soft rays of dorsal and anal also peppered with dark points; pectoral a little more than head, not quite to vent, 3 in body; second anal $1\frac{1}{3}$ in head. equals 3 in length but shorter, $4\frac{2}{5}$ in body; second anal spine a little longer and ventral paler than in Cuban specimens (*patao.*)

1757. GERRES EMBRYX, Jordan & Starks, new species.

Head 3; depth $2\frac{1}{5}$. D. IX, 10; A. III, 8; scales 5–35–10; snout $3\frac{1}{8}$ in head; maxillary $2\frac{3}{5}$; eye 4; second dorsal spine $1\frac{1}{2}$; second anal spine $1\frac{3}{5}$; pectoral $\frac{1}{7}$ longer than head; ventrals $1\frac{1}{2}$; caudal lobe $1\frac{1}{6}$. Body compressed and angular, the back elevated; profile slightly concave over eye, thence strongly convex to dorsal; snout pointed; mouth moderate, the maxillary reaching slightly past anterior margin of pupil, width of its exposed portion $2\frac{1}{3}$ in its length; jaws about equal; teeth in the upper jaw minute, very slender, and movable; teeth in lower jaw obsolete; preorbital and preopercle serrate; gill rakers short, about 7 + 14; pharyngeals with short blunt, pebble-like teeth on the middle, and small sharp conical teeth on the outer edge. Cheeks with 4 or 5 rows of scales; snout from about middle of eye, preorbital ring, suborbital, maxillary, and lower jaw scaleless; basal sheath of dorsal composed of 1 row of scales; lateral line running high. Dorsal spines high, the second, which is much the strongest and longest, when depressed, reaching to the base of the last; longest dorsal ray about $\frac{1}{2}$ second spine; third anal spine the longest but not so strong as second, its tip reaching well past end of last ray, when fin is depressed; pectoral very long and falcate, reaching to the vertical from the front of anal, $\frac{1}{6}$ longer than head, $2\frac{2}{7}$ in body; ventrals reaching past vent, but not to anal; caudal deeply forked. Color in spirits, silvery, darker above; sides with about 11 longitudinal dark streaks following the rows of scales, 1 following the lateral line, those above parallel to it, those below more longitudinal; tip of snout black above; dorsal, caudal, and ventrals, dusky; other fins colorless; axil dusky. Length about a foot. Coast of South Carolina, in rather deep water, in company with *Calamus leucosteus, Centropristes philadelphicus, Larimus fasciatus,* and *Stellifer lanceolatus.* Here described from a specimen (No. 449, L. S. Jr. Univ. Mus.) 12 inches long, taken at Charleston, by Mr. Charles C. Leslie. (ἔν, in; βρύξ, the ocean depths.)

1758. GERRES PLUMIERI, Cuvier & Valenciennes.

(MOJARRA.)

Head 3; depth $2\frac{1}{6}$; eye rather large, 3 in head; snout 4 in head; scales 5–37–11. D. IX, 10; A. III, 8. Body compressed, rhomboidal in form, back very much elevated. Mouth rather large, maxillary extending slightly beyond vertical from anterior margin of pupil, its length $2\frac{5}{6}$ in head; exposed portion of maxillary oblong, its width $2\frac{1}{2}$ in length, which is $4\frac{3}{4}$ in length of head; preorbital and preopercle serrate; premaxillary groove broad and entirely free from scales; gill rakers small, weak, 13 below the angle; distance from tip of snout to dorsal fin equal to the greatest depth of fish; upper margin of dorsal fin much concave; second dorsal spine very strong and long, its length equaling length of head; second anal spine stronger and slightly shorter than the second dorsal spine, its tip reaching to the vertical from base of caudal rays; third spine shorter and much weaker than second; pectoral fins reaching beyond the front of anal, their length $2\frac{2}{3}$ in length of body; ventral fins reaching past vent, almost to front of anal, their length $3\frac{2}{5}$ in length of body. Color bluish-silvery above, silvery below; very distinct dark longitudinal lines along each row of scales; dorsal, caudal, and anal fins dusky; margin of dorsal fin black; a dark supraorbital spot; pectoral and ventral fins pale. Length 10 inches. Atlantic coast of tropical America, and West Indies; rather common; north to eastern Florida; known from Havana; Porto Rico; San Domingo; Jamaica; Martinique; Indian River, Florida; Pernambuco; Bahia; Aspinwall; and Guatemala. Here described from a specimen from Havana. (Named for Charles Plumier, who early made paintings of the fishes of Martinique.)

Gerres plumieri, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 452, 1830, Antilles; Porto Rico; GÜNTHER, Cat. Fishes, I, 340, and IV, 253; JORDAN & GILBERT, Synopsis, 583; EVERMANN & MEEK, *l. c.*, 270.

1759. GERRES MEXICANUS, Steindachner.

Head 4; depth $2\frac{1}{2}$; scales (6–43 to 45[*]–12). Closely allied to *G. plumieri*, the body longer, the scales smaller, the second anal spine shorter, $\frac{5}{8}$ length of second dorsal spine and $1\frac{1}{2}$ in head; second dorsal spine nearly as long as head (much[*] stronger than third but not much higher, 3 in body); pectoral short, as long as head, $3\frac{2}{3}$ in body, not reaching anal ($4\frac{1}{2}$ scales[*] in a series from fourth dorsal spine to lateral line, 6 series between[*] first dorsal spine and lateral line); preorbital and preopercle serrate. Color much as in *G. plumieri*, but paler. Rio Teapa, Mexico, 1 specimen known (Steindachner); not seen by us; apparently distinguished by the small scales.

Gerres mexicanus, STEINDACHNER, Ueber eine neue Gerres-Art, aus Mexico, Verh. K. K. Geo. Wien, XIII, 1863, 383, Rio Teapa, Mexico.

Family CLIV. KYPHOSIDÆ.

(THE RUDDER FISHES.)

Herbivorous fishes, with incisor teeth only in the front of the jaws. Body oblong or elevated, with moderate or small scales, ctenoid or not. Mouth moderate, with incisor-like teeth in the front of each jaw; no molars; teeth on vomer and palatines present or absent; premaxillaries moderately protractile; preorbital rather narrow, sheathing the maxillary. Gill rakers moderate; pseudobranchiæ well developed; opercles entire. Gills 4, a slit behind the fourth; gill membranes separate, free from the isthmus; dorsal fin continuous or divided, with 10 to 15 rather strong spines, the soft dorsal naked or scaly; anal with 3 spines; ventrals thoracic, the rays I, 5, an accessory scale at base; caudal lunate or forked; pectoral fin with all its rays branched. Intestinal canal elongate, with few or many pyloric cæca. Air bladder usually with 2 posterior horns. Vertebræ in ordinary or slightly increased number, 24 to 28. Post-temporal of normal percoid form, the stout forks not adnate to the cranium. Herbivorous shore fishes, feeding largely on green or olive algæ; chiefly of the Mediterranean Sea and the Pacific Ocean; most of them valued as food. Genera 20, species about 70. (*Sparidæ*, groups *Cantharina* and *Pimelepterina*, Günther, Cat. Fishes, I, 413–432; 497–499, 1859.)

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[*] These characters in parentheses, not in the original description, are given in a letter from Dr. Steindachner, date August 3, 1895.

GIRELLINÆ:

a. Soft part of dorsal and anal fins naked or partly scaled; head more or less naked; teeth in broad bands, all freely movable, none on vomer; pyloric cæca very numerous; vertebræ in somewhat increased number. Pacific Ocean.

b. Incisors all tricuspid.

c. Dorsal spines 14 or 15; each jaw with a series of flat, movable, tricuspid incisors, behind which is a broad band of similar smaller ones; dorsal continuous, its spines low. GIRELLA, 563.

cc. Dorsal spines 12 or 13; "in both jaws series of flat, tricuspid teeth, behind which is a band of similar teeth, less developed and replacing the former;" soft dorsal and anal elevated. DOYDIXODON, 564.

KYPHOSINÆ:

aa. Soft parts of vertical fins closely scaly; teeth more or less fixed, usually present on vomer; pyloric cæca numerous.

d. Top of head as far back as posterior margin of eyes, naked; incisor teeth narrow, equal, rounded; spinous dorsal much longer than soft dorsal; soft anal higher and shorter than soft dorsal. HERMOSILLA, 565.

dd. Top of head as well as sides and jaws closely scaled; broad bands of teeth behind the incisors; villiform teeth on vomer, palatines and tongue; dorsal spines low; incisor teeth lanceolate.

e. Incisor teeth strong, with horizontal, backward projecting roots; soft dorsal and anal not much elevated.

f. Incisor teeth well developed, each with a conspicuous horizontal process or root; caudal fin moderate, about as long as the head, the outer rays not 3 times as long as the middle rays; junction of gill membranes forming an angle. KYPHOSUS, 566.

ff. Incisor teeth small, with inconspicuous roots; caudal much longer than head, the lobes falcate, the outer 5 times length of middle rays; gill membranes not forming an angle at junction. SECTATOR, 567.

ee. Incisor teeth very narrow, without evident roots.

g. Anal fin short, 3¾ in length of body, its rays III, 19; dorsal spines gradually increasing in height to the sixth, then decreasing backward; soft dorsal and anal not falcate; preopercle slightly serrate; teeth narrow but evidently compressed. MEDIALUNA, 568.

563. GIRELLA, Gray.

Girella, GRAY, Illustrations of Indian Zoology, about 1840 (*punctata*).
Melanichthys, TEMMINCK & SCHLEGEL, Fauna Japonica, Poissons, 75, 1850 (*punctatus*).
Camarina, AYRES, Proc. Cal. Ac. Sci. 1860, 81 (*nigricans*).

Body oblong-ovate, compressed, covered with rather large scales. Mouth small, with a series of tricuspid, movable incisors, behind which is a broad band of similar smaller ones; no molar teeth; no teeth on vomer or tongue; lower pharyngeal teeth slender. Cheeks with very small scales; opercles and top of head chiefly naked. Gill rakers slender. Dorsal fin rather low, with about 14 spines, on the bases of which the scales extend, forming an imperfect sheath; no groove at base of dorsal; no procumbent dorsal spine; anal spines small, graduated; caudal lunate. Air bladder divided into 2 posterior horns. Pyloric cæca numerous; intestinal canal elongate; peritoneum black. Vertebræ 11+16 or 17=27 or 28. Herbivorous. Pacific Ocean. This genus contains several species found on the east coast of Asia and one characteristic of the rocky shores of California. They are herbivorous fishes, feeding on seaweeds. (From the French "*Girelle,*" which is a derivative of *Julis,* and is applied to smaller Labroids.)

1760. GIRELLA NIGRICANS (Ayres).

(GREEN-FISH.)

Head 4; depth 2¼. D. XIV, 14; A. III, 12; scales 50; vertebræ 11+16=27. Body oval, compressed, with very deep caudal peduncle; snout thick, its profile evenly rounded; mouth small, subinferior, the maxillary reaching nearly to front of orbit; a minute patch of palatine teeth; each jaw with a series of flat, tricuspid, movable incisors, behind which is a broad band of smaller ones; no teeth on vomer or tongue; cheeks with very small scales; opercles and top of head naked; preopercle minutely serrulate at its angle; preorbital as broad as eye; gill rakers numerous, rather long; scales firm, weekly ctenoid, those on thorax and front of back smaller; dorsal spines lower than soft rays, with an imperfect sheath of scales at their base; anal spines small, graduated, the soft rays higher than those of the dorsal; caudal lunate; pectorals short and broad, not reaching vent; ventrals short; air bladder with 2 posterior horns; intestinal canal very long; pyloric cæca numerous; peritoneum black. Color dusky green, paler below; fins dusky greenish; young with a large yellowish blotch on the back on each side of dorsal. Length about a foot. Coast of southern California from Monterey to Cape San Lucas; abundant in rocky places, the young a common and active inhabitant of rock pools; a food-fish of fair quality. (*nigricans,* blackish.)

Camarina nigricans, AYRES, Proc. Cal. Ac. Sci. 1861, 81, fig. 22, California.
Girella dorsomacula, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 244, Cape San Lucas; young. (Coll. Xantus.)
Girella nigricans, JORDAN & GILBERT, Synopsis, 560, 1883; JORDAN & FESLER, *l. c.,* 531, 1893.

564. DOYDIXODON, Valenciennes.

Doydixodon, VALENCIENNES, Voyage de la Vénus, v, 318, 1855 (*freminvillei*).

Dorsal spines 12 or 13. "In each jaw a series of flat tricuspid teeth, behind which is a band of similar teeth, less developed and replacing the former;" soft dorsal and anal elevated, otherwise as in *Girella,* from which it is doubtfully separated. Species all American; not well known. (*δύο,* two; *δίξοος,* forked; *ὀδούς,* tooth.)

1761. DOYDIXODON FREMINVILLEI, Valenciennes.

D. III, 15; A. III, 12; scales about 60. Color uniform dark green, or banded with darker. Form, squamation, and dentition as in *Girella nigricans* (Valenciennes). Galapagos Islands and coast of Peru; known to us from the figure of Valenciennes, which closely resembles *Girella nigricans,* but the number of dorsal spines is fewer. (Named for Chrétien Paulin de Freminville, an early French naturalist and explorer.)

Doydixodon freminvillei, VALENCIENNES, Voyage Vénus, v, 323, pl. 5, 1855, Galapagos Islands.

Doydixodon fasciatum, KNER & STEINDACHNER, Sitzb. Akad. Wien, LIV, 358, fig. 2, Iquique, Peru.

Doydixodon freminvillei, JORDAN & FESLER, *l. c.*, 532, 1893.

565. HERMOSILLA, Jenkins & Evermann.

Hermosilla, JENKINS & EVERMANN, Proc. U. S. Nat. Mus. 1888, 144 (*azurea*).

This genus is allied to *Kyphosus*, from which it differs in the weaker gill rakers; in having the margin of the preopercle entire; in having no teeth on the tongue; in the squamation, the scales on the body being larger; head not so completely scaled; top of head, snout, preorbitals, space below the eye, chin, and preopercles, naked. It also differs in the relative sizes and forms of the vertical fins; the spinous dorsal is much longer than the soft dorsal, and the soft anal is higher and shorter than the soft dorsal. One species, from the Pacific Coast of Mexico. (Hermosilla, name of the capital city of Sonora, along the coast of which State the typical species was taken, the name derived from Spanish *hermoso*, beautiful; Latin, *formosus*.)

1762. **HERMOSILLA AZUREA**, Jenkins & Evermann.

Head 3; depth 2; eye 3⅗ in head. D. XI, 11; A. III, 10; scales 11–55–17. Body ovate, compressed, head short, snout 3 in head, blunt; maxillary barely reaching front margin of eye, 3⅔ in head. Each jaw with a single series of close-set, equal, narrow, rounded incisors, the villiform teeth behind them small or obsolete, not evident in the type; teeth on vomer not evident in the type; gill rakers slender, the longest about the diameter of the eye, 3 + 12; preopercle entire; preorbital ⅔ diameter of eye, nearly covering the maxillary. Top of head as far back as the posterior margin of the eyes, snout, preorbitals, a narrow space below eye, chin and preopercles, naked; top of head covered with pores; preopercles with a network of grooves; remaining parts of head and body scaled; 5 rows of scales on cheek below eye, about 6 rows on the opercle; subopercle with 1 row; fins, with the exception of the spinous dorsal, covered more or less with fine scales; scales moderate, ctenoid, not crowded anteriorly; lateral line complete, traceable but a short distance on the caudal. Dorsal fin with 11 spines, the seventh, which is the longest, 1⅘ in head; the alternate ones very strong, the spinous part continuous with the soft portion, the last spine not much lower than the soft dorsal, thus leaving but a slight depression between the two; the spinous part depressible into a groove; base of spinous part about ½ longer than the base of the soft portion; soft anal shorter and higher than soft dorsal; anal with 3 spines, short but strong, the second the longest, 1⅓ times diameter of eye; caudal forked, upper fork the longer; pectoral 1½ in head, not quite equaling the ventrals which begin behind them. Depth of caudal peduncle 7 in body; interorbital space 2¾ in head;

peritoneum black. Color dark steel-blue, paler below; body with about 12 nearly vertical blackish cross bands about as wide as the eye; below eye silvery, with a dark streak from maxillary to angle of opercle; opercular blotch black; a black blotch in the axil; fins mostly dark. Two larger specimens 11 and 13 inches long collected by the *Albatross* at San Bartholome Bay, Lower California, differ notably in form, and may possibly belong to a distinct species. Head 3¾; depth 2½. D. XI, 11; A. III, 10; scales 9–55–17; snout 3 in head; eye 5; interorbital 2¾; maxillary 3½; longest dorsal spine 2½; second anal spine 3½; longest dorsal ray 3; longest anal ray 2⅓; pectoral 1⅗; ventral 1⅗; caudal lobe 1¼. Body oblong-ovate, compressed; head short; maxillary barely reaching front of eye; each jaw with a single series of equal rounded incisors with small villiform teeth behind them; villiform teeth on vomer; gill rakers as long as the diameter of pupil, about 3 + 12. Top of head as far back as posterior margin of eye, snout, maxillary, lower jaw, preorbital, suborbital ring, and edge of preopercle, naked; cheeks with 6 series of scales, 6 rows on the opercle; the fins covered with fine scales; dorsal with a well-developed sheath of scales. Spinous dorsal the higher; second and third anal spines about equal, the first rays the longest, fin sharply angulated in front; ventrals placed well behind pectorals, their tips not reaching the vent; caudal emarginate, the lobes about equal. Color in spirits, slaty above with 12 or 13 dark cross bars which fade out below pectoral; a streak across maxillary and preopercle below eye, and one across snout through eye; belly silvery, fins all dusky, ventrals tipped with black, a black blotch on axil; edge of opercle black, a conspicuous black blotch above angle. Known only from these 2 specimens and the types, 2 specimens 8 and 9 inches long respectively, from the Bay of Guaymas. Length a foot. (*azureus*, sky-blue.)

Hermosilla azurea, JENKINS & EVERMANN, Proc. U. S. Nat. Mus. 1888, 144, Guaymas (Type, No. 36269. Coll. Jenkins & Evermann); EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 156, pl. 1, fig. 3; JORDAN & FESLER, *l. c.*, 533, 1893.

566. KYPHOSUS, Lacépède.

(CHOPAS.)

Kyphosus, LACÉPÈDE, Hist. Nat. Poiss., III, 114, 1802 (*bigibbus*=*fuscus*).
Pimelepterus, LACÉPÈDE, Hist. Nat. Poiss., IV, 429, 1803 (*bosqui*=*sectatrix*).
Dorsuarius, LACÉPÈDE, Hist. Nat. Poiss., V, 482, 1803 (*nigrescens*=*fuscus*).
Xyster, LACÉPÈDE, Hist. Nat. Poiss., V, 484, 1803 (*fuscus*).
Saleima, BOWDICH, Excursion Madeira, 238, 1825 (*aurata*).
? *Opisthistius*, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 245 (*tahmel*).

Body elongate-ovate, regularly elliptical, moderately compressed; head short, with blunt snout; eye large; mouth small, horizontal; maxillary barely reaching front of eye; each jaw with a single series of rather narrow obtusely lanceolate incisors, implanted with compressed conspicuous roots posteriorly; behind these a narrow band of villiform teeth; fine teeth on vomer, palatines, and tongue. Branchiostegals 7; gill rakers long. Preopercle obsoletely serrate; preorbital narrow, covering but little of the maxillary. Squamation very complete, the space between and about the eyes being the only naked part; scales smallish, thick, ctenoid, 60 to 70 in the lateral line, which is continuous; similar scales entirely covering the soft parts of the vertical fins, and extending up on the paired fins. Dorsal fin low, with about 11 spines, which are depressible in a groove of scales, the fin continuous, but the last spines low, so that a depression occurs between the two parts of the fin, the bases of the spinous and soft parts about equal; soft dorsal rather low in front, not falcate, pointed behind; anal similar to soft dorsal, with 3 spines; caudal fin moderately forked; pectoral fins small, ventrals well behind them. Intestinal canal long. Pyloric cæca very numerous. Vertebræ 9 or 10 + 15 or 16 = 25. This genus contains some 10 species, chiefly confined to the Pacific Ocean, and most of them found in the East Indies. (*κῦφος*, a hump, the word more correctly written *cyphus*, and referring to a deformed specimen with a hump back.)

a. Soft part of anal very long and low, its longest rays 3½ to 4 in head, and 3 in soft part of the fin. D. XI, 14; A. III, 12; scales small, about 85 in lateral line, those on cheek in 17 series; teeth about 30 in each jaw, narrow, the jaw short. Color bright gray, the sides steel blue, with paler lengthwise stripes of bright bronze. Depth more than ½ length. ANALOGUS, 1763.

aa. Anal fin moderately elevated in front and rather short, its rays III, 11, the longest ray 1½ to 2 in the base of the soft part of the fin. D. XI, 11 or 12. Teeth 35 to 40 in each jaw.

  b. Teeth rather narrow and subacute; maxillary short, barely reaching eye, about 3½ in head.

    c. Scales moderate, 10–65–20; anal rays III, 13. Coloration bright plumbeous, with many bright yellow streaks on a plumbeous ground. Mouth and teeth not fully described. INCISOR, 1764.

    cc. Scales smaller, about 12–67–20; anal moderate, its longest ray 2½ in head and ½ base of soft part of fin; body deep, the depth 2 in length; snout blunt; scales on cheek in 10 series. Coloration dull pale gray, the dark streaks broader than in *K. analogus*. A. III, 11. ELEGANS, 1765.

    ccc. Scales rather large, 10–55–16; depth 2⅓ in length; head 3¾. Coloration dusky gray, with about 25 gray streaks following the rows of scales, those near middle of body broadest; a silvery streak along preorbital. D. XI, 12; A. III, 11. SECTATRIX, 1766.

  bb. Teeth broad and rounded; maxillary rather long, reaching opposite pupil, 3½ in head; scales small, 12–72–24; depth of body 2¼ in length; head 3⅔; pectoral 1⅗ in head. D. XI, 11; A. III, 11. Color dark steel blue, the pale stripes obscure; sometimes varying to entirely bright lemon yellow; sometimes with the head yellow or with yellow blotches. LUTESCENS, 1767.

1763. KYPHOSUS ANALOGUS (Gill).

(SALEMA.)

Head 4; depth 2¼. D. XI, 14; A. III, 12 or 13; eye 4½ in head; snout 3; maxillary 3⅓; pectoral 1¾, equal to ventrals; longest ray of soft dorsal 3½; longest dorsal spine 2⅓; upper lobe of caudal as long as head; scales 13–76–20; gill rakers 8 + 16. Body compressed, elliptical; profile in some specimens evenly curved from tip of snout to dorsal, in others slightly produced before eyes and concave over snout. Mouth small, horizontal; jaws equal; teeth in a single series, from 22 to 28 in each jaw; maxillary extending to the vertical from the front of eye. Snout, lower jaw, and preorbital naked, head elsewhere with scales; 12 to 15 rows of scales on opercle; scales on body much crowded anteriorly; all the fins, with the exception of spinous dorsal, entirely scaled. Tip of pectoral sharply rounded; front of anal not greatly elevated, its longest ray 3 in base of fin, which is about equal to head; spinous dorsal higher than soft dorsal; upper lobe of caudal the longer. Color in life, steel blue, brighter than in *elegans*; with bronze streaks along the edges or rows of scales, much brighter than in *elegans;* a broader gray streak bordered with bronze at base of soft dorsal; a large brassy spot in the axil, extending along shoulder girdle, a deep bronze stripe through eye, another back from angle of mouth, the two separated by steel blue; fins all blue black, with some bronze, especially on pectoral. Body more elongate than in *elegans;* the form more elliptical; the mouth less blunt, with fewer teeth; the scales smaller and more crowded anteriorly; the fins lower, especially the anal. Largest specimen 18 inches long. Pacific coast of tropical America, Gulf of California to Panama. Here described from Mazatlan specimens. A beautiful species rather common about Mazatlan, both in the estuary and in deep water in the neighborhood of the islands. Its range along the coast is not definitely distinguished from that of *K. elegans*, the two having been recorded as identical by authors who had seen but one. They were first properly distinguished by Evermann & Jenkins, who obtained both at Guaymas. The marked difference in color, however, does not appear in the descriptions of Evermann & Jenkins, which were drawn from specimens preserved in alcohol. Specimens examined by us from Guaymas, Cape San Lucas, Porto Escondido, and Mazatlan. (*analogus*, analogous,—to *Kyphosus sectatrix*, but its relations are rather with *Kyphosus incisor*.)

Pimelepterus analogus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 245, Cape San Lucas. (Coll. Xantus.)

Kyphosus analogus, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 154; JORDAN & FESLER, *l. c.*, 534, 1893; JORDAN, Proc. Cal. Ac. Sci. 1895, 465.

1764. KYPHOSUS INCISOR (Cuvier & Valenciennes).

(CHOPA AMARILLA.)

Head 5 in total with caudal; depth 3. D. XI, 14; A. III, 13; scales 10-65; pores 20; anal a third higher than soft dorsal; caudal lunate; teeth as in *K. sectatrix;* preopercle scarcely serrate; scales of back much smaller than those of sides, as are also those of head, throat, and belly. Plumbeous, with yellow lines marking edges of the scales; besides the yellow streak across cheek to axil, another below eye ending on opercle; yellow streak before nostrils emphasized by black edgings; fins blue, deeper on the soft part; base of pectoral with yellow scales. Cuba (Poey) to Brazil and the Canary Islands; not seen by us; a large species reaching 2½ to 3 feet in length, a larger size than is attained by *K. sectatrix*. Evidently distinct from *Kyphosus sectatrix*, with which it is confounded by Jordan & Fesler, its relations being with *K. analogus*. (*incisor*, one that cuts; from the teeth.)

?*Saleima aurata*, BOWDICH, Excursion Madeira, 238, 1825, Bona Vista Island; description and figure very bad. D. X, 17; A. III, 14; body with light orange stripes.

Pimelepterus incisor, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 266, 1831, Brazil. (Coll. Delalande.) (*Chætodon incisor*, PARKINSON MS., about 1765.)

Pimelepterus flavolineatus, POEY, Repertorio, 319, 1866, Havana. (Coll. Poey.)

1765. KYPHOSUS ELEGANS (Peters).

(CHOPA.)

Head $3\frac{2}{3}$; depth 2. D. XI, 12; A. III, 11; scales 11–63–17; eye 4 in head; snout $3\frac{1}{4}$; maxillary $3\frac{1}{5}$; pectoral $1\frac{3}{5}$, equals ventral; longest ray of soft dorsal $2\frac{1}{2}$; longest dorsal spine $2\frac{1}{2}$; longest anal ray 2; upper lobe of caudal equals head. Gill rakers $6+15$. Body ovate, compressed; profile rounded, slightly produced before eyes, concave over snout in some specimens, straight in others; a gentle curve from eyes to dorsal; mouth small, horizontal, the jaws equal; teeth in a single series, about 36 in each jaw; maxillary extending to the vertical from anterior edge of orbit; snout, lower jaw, and preorbital naked, head everywhere else scaled; opercles with 8 or 9 rows of scales; scales on body large, somewhat crowded anteriorly; all the fins, except spinous dorsal, with scales to their edges, those on caudal exceedingly small. Tip of pectoral sharply rounded, not reaching to tips of ventrals; ventral spine half as long as soft rays; anal spines short and stout, graduated; anal elevated in front and higher than soft dorsal; middle spines of dorsal the longest, about equal to highest rays of soft dorsal; upper lobe of caudal the longer. Vertebræ $9+16$ or $10+15$. Color grayish black, with paler centers to the scales; about 16 streaks below lateral line; sides with large faint diffuse yellowish white spots; a little bluish and yellowish on sides of head; a yellow streak below lower part of eye; no steel blue or bronze in life, the coloration much duller than in *K. analogus*. Pacific Coast of tropical America from Guaymas to Mazatlan. Here described from Mazatlan specimens. This species is rather common about Mazatlan, especially in the sluggish waters of the Astillero. It reaches a length of about 15 inches. (*elegans*, elegant, but its colors are less bright than usual in this genus, and the body deeper.)

Pimelepterus elegans, PETERS, Berliner Monatsberichte, 707, 1869, Mazatlan.
Kyphosus elegans, EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 155; JORDAN & FESLER, *l. c.*, 535, 1893; JORDAN, Proc. Cal. Ac. Sci. 1895, 466.

1766. KYPHOSUS SECTATRIX (Linnæus).

(RUDDER-FISH; BERMUDA CHUB; CHUB; CHOPA BLANCA.)

Head $3\frac{3}{4}$; depth $2\frac{1}{8}$. D. XI, 12; A. III, 11; scales 10–55–16. Vertebræ $9+16$. Body ovate, somewhat compressed; longest dorsal spine $\frac{1}{5}$ the height of body, rather higher than soft dorsal and nearly equal to longest ray of anal; teeth 35 to 40 on each side; horizontal process of the teeth not much longer than the vertical; interorbital space $2\frac{1}{2}$ in head; top and sides of head finely scaled; interorbital region gibbous, below which point the snout is truncate; preopercle weakly serrulate; gill rakers long; soft dorsal and anal very low; the longest ray of anal $2\frac{1}{4}$ in head, longest spine $2\frac{1}{4}$; median dorsal spines highest; second anal spine highest; caudal well forked, the lower lobe longer. Color in life steel gray, very slightly bluish, not much paler below; the edges of each row of scales on back and sides slightly brassy, so that very faint yellowish stripes alternate with bluish ones of about equal width; a diffuse pale stripe below eye, a yellowish one above and below this; fins all dull grayish; ventrals and anal somewhat blackish; edge of opercle slightly darker. Here described from Key West specimens. West Indies, ranging from Cape Cod to the West Indies, crossing the ocean to the Canary Islands; accidental in the Mediterranean, once taken at Palermo by Professor Pietro Doderlein. Not rare off our Atlantic coasts, becoming rather common southward, especially at Key West. It has long been noted for its habit of following vessels, supposably for the waste food thrown from them, hence called Rudder-fish. A fish of considerable game qualities. Length 18 inches. (feminine of *sectator,* one who follows.)

Perca marina sectatrix (the Rudder-fish), Catesby, Nat. Hist. Car. 1738, Carolina.
Perca saltarix, Linnæus, Syst. Nat., Ed. x, 293, 1758 (misprint, incorrectly copied from Catesby, who called it *sectatrix*), Carolina.
Chætodon cyprinaceus (Broussonet), Gmelin, Syst. Nat., I, 1269, 1788, name only; on a specimen from the tropical Atlantic. (Coll. Parkinson, in Voyage Capt. Cook; described by Cuvier & Valenciennes, *l. c.*, VIII, 263.)
Pimelepterus bosquii, Lacépède, Hist. Nat. Poiss., IV, 429, 1803, South Carolina. (Coll. Bosc.)
Pimelepterus oblongior, Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 264, 1831, locality unknown; depth 3 in total length; 14 longitudinal streaks.
Pimelepterus bosci var. *sicula,* Doderlein, Nat. Sicil., Ann. 11, fasc. 2, 1883, Palermo.
Pimelepterus bosci, Cuvier & Valenciennes, Hist. Nat. Pois., VII, 258, pl. 187, 1831; Jordan & Gilbert, Synopsis, 561, 1883.
Perca sectatrix, Linnæus, Syst. Nat., Ed. XII, 486, 1766.
Cyphosus bosqui, Jordan, Proc. U. S. Nat. Mus. 1884, 128.
Kyphosus sectatrix, Jordan & Fesler, *l. c.*, 525, 1893.

1767. KYPHOSUS LUTESCENS (Jordan & Gilbert).

Head 3⅔; depth 2¼. D. XI, 11; A. III, 11; scales 12–67–22. Body oblong-elliptical, robust; the dorsal and ventral outlines moderately and nearly equally arched; head bluntish; the profile evenly curved, without depression in front of the eye; the preorbital region less gibbous than in *K. sectatrix;* mouth terminal, the lower jaw slightly the shorter, the broad maxillary reaching to opposite the front of the eye, its width about equal to that of the preorbital; teeth in both jaws broad, rounded or subtruncate, in single rows, the horizontal roots longer than the crown, but not twice as long; about 36 teeth in each jaw; behind the large teeth in each jaw is a band of rasp-like asperities; gill rakers short, about 6 + 16; preopercle with its angle rounded and membranaceous, the vertical limb straight and minutely serrulate; cheeks with 10 or 11 rows of scales, including smaller ones; preorbital, jaws, snout, rim of eye, and rounded part of preopercle naked, the head otherwise closely scaly; scales on body rather small, firm, smoothish, those on breast smaller; fins, as usual, with the soft parts covered with small scales; dorsal spines rather high and strong, the middle ones highest, higher than the soft rays, nearly twice the height of the last spine, and 2⅓ in head, 3⅔ in greatest depth of body; soft dorsal rather high, not at all falcate, the first rays ⅖ the length of the head; anal fin similar, shorter and higher, the spines graduated, the longest rays more than ½ length of head; caudal wide, moderately forked, the lobes equal, the longer as long or a little longer than head, the depth of the fin, from tip to tip, about equal to greatest depth of body. Pectorals short, slightly longer than ventrals, as long as from snout to edge of preopercle. Ventrals placed well behind pectorals, not reaching vent. Coloration in spirits, nearly uniform light grayish, without distinct markings; golden yellow in life, according to Lieutenant Nichols; very faint darker streaks present along the rows of scales; preorbital, suborbital, and preopercle bright silvery; lower jaw silvery; both jaws dusky at tip; fins all pale; very obscure darker blotch in front of base of pectoral. Numerous specimens collected by Robert C. McGregor at Clarion and Socorro islands show surprising variations in color. Some are wholly dark steel blue, the pale streaks faint, some are bright lemon yellow as the original type, while others have yellow blotches variously placed, sometimes the head only bright yellow.

The species resembles *K. elegans*, but is very distinct, the depth less 2¼ to 2⅕ (2 in *elegans*), the scales smaller, almost as small as in *K. analogus*, the streaks narrow and obscure. The anal is higher and shorter than in *elegans*, its longest ray 1½ in base of soft part, 2¼ in head. Pectoral longer, 1⅖ in head (1⅗ in *elegans*). Teeth broader and more compressed than in any other of our species, the maxillary longer, reaching to opposite pupil, 3⅕ in head (3⅓ in *elegans* and *analogus*), the premaxillary processes extending farther back. Longest ray of anal is 3 in base of soft part of fin in *analogus*, 2 in *elegans*, 1½ in *lutescens*. Length 16 inches. Revillagigedo Archipelago; known only from Socorro and Clarion islands. (*lutescens* growing yellow.)

Pimelepterus lutescens, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 229, Braithwaite Bay, Socorro Island (Coll. Lieut. Nichols); JORDAN, Bull. U. S. Fish Comm. 1881, 328.
Kyphosus lutescens, JORDAN, Proc. U. S. Nat. Mus. 1885, 380; JORDAN & FESLER, *l. c.*, 536.

567. SECTATOR, Jordan & Fesler.

Sectator, JORDAN & FESLER, Review Sparoid Fishes, 534, 1893 (*ocyurus*).

This genus is very close to *Kyphosus*, from which it differs in its smaller incisor teeth, which have very inconspicuous roots, and by the deeply forked caudal. (*sectator*, one that follows, a name early applied to the rudder-fish from its custom of following ships.)

1768. SECTATOR OCYURUS (Jordan & Gilbert).

Head 3⅘; depth 2⅘. D. XI, 13; A. III, 14; scales 12–78–20 (rows). Body oblong-elliptical, much less compressed and elevated than in related species; both dorsal and ventral outlines regularly and nearly equally curved; frontal region little gibbous, the depression below it little marked and the snout scarcely blunt; mouth small, terminal, the lower jaw slightly included; maxillary not reaching front of eye; incisor teeth very small, about 30 in the upper jaw lanceolate, each with a very small horizontal process, shorter than the tooth; behind them a band of scarcely evident asperities; patches of similar asperities on vomer and palatines; eye very large, nearly as long as snout, its diameter nearly ½ interorbital width and ¼ length of head; preopercle produced and rounded at angle, its margin weakly serrulate; gill membranes united straight across breast, free from the isthmus, their free border under posterior part of eye; gill rakers small and short; pseudobranchiæ present; head more completely scaled than in *K. sectatrix;* the naked areas similar, but more restricted; scales striated and rugose, but scarcely ctenoid, much smoother than in *K. sectatrix,* those on middle of sides largest, those on breast not much reduced in size; soft dorsal and anal completely covered with scales, the pectorals and caudal nearly so; dorsal spines low, the longest 3¼ in head, the base of the fin nearly equal to that of the soft dorsal or the anal; soft dorsal very low, its last ray longest, its middle rays not so long as the eye; caudal extremely long, deeply forked, the lobes falcate, the upper rays more than 4 times the length of the middle rays and equal to the greatest depth of the body; anal long and low, its base greater than length of head, its last ray longest, its middle rays shorter than eye; anal spines small, graduated; ventrals short, well behind pectorals, nearly ½ length of head, and reaching halfway to front of anal; pectorals short, a little more than ½ head. Color in life: Back and sides above light olive-brown, becoming yellowish-olive below; belly and lower part of sides white; each side of back with a very distinct dark-blue stripe, commencing a little in front of origin of dorsal and running to upper lobe of caudal fin, gradually increasing in width backward to caudal peduncle, along which it is suddenly narrowed; a small blue spot on median line between the orbits, a broad blue stripe from snout through eye to suprascapula; a second from snout through lower margin of orbit to opercle, where it is abruptly expanded; lores golden, a broad golden stripe behind angle of mouth, not reaching preopercular margin; a broad dark-blue stripe from above base of pectorals straight to base of median caudal rays; below this is a narrower golden stripe; lower part of sides with indistinct longitudinal brownish streaks along the margins of the series of scales; vertical fins golden yellow, caudal narrowly margined with black; pectorals brown within, the outer side silvery with yellow tinge; ventrals yellow on inner margins, silvery on the outer; roof of mouth and tongue bright white. Panama; known only from the original types. (ὠκύς, swift; οὐρά, tail.)

Pimelepterus ocyurus, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 327, 328, Bay of Panama. (Type, No. 29395, U. S. N. M. Coll. C. H. Gilbert.)

Kyphosus ocyurus, JORDAN, Proc. U. S. Nat. Mus. 1885, 380; JORDAN & FESLER, *l. c.*, 536.

568. MEDIALUNA, Jordan & Fesler.

(MEDIALUNAS.)

Medialuna, JORDAN & FESLER, Review Sparoid Fishes, 536, 1893 (*californiensis*).

Body ovate-elliptical, covered with small, firm, ctenoid scales, which also cover the membranes of the soft parts of the vertical fins; mouth small, terminal, horizontal; the maxillary narrow, slipping under the edge of the rather narrow preorbital; sides, top of head, and jaws closely scaled; preopercle minutely crenulate at angle; jaws with broad bands of slender teeth, those in the outer series incisor-like, compressed, narrow, and lanceolate in form, the outer surface transversely convex, the inner concave; the other teeth of the jaws similar, but grow progressively smaller backward toward the inside of the mouth; incisors without conspicuous roots behind; all the teeth somewhat movable, as in *Girella;* no molar teeth; vomer, palatines, and tongue with patches of minute villiform teeth; gill rakers slender, rather long; dorsal spines low, in a slight groove, about 10 in number, gradually increasing in height to the sixth, then decreasing; soft part of the fin elongate, much longer than the spinous part, not falcate, the longest ray $\frac{2}{3}$ base of the soft-rayed part of fin, the fin pointed behind; anal comparatively short, its base $3\frac{3}{4}$ in body, its rays III, 19; anal spines small, graduated, the soft rays numerous; caudal lunate; scales thinnish, adherent, with smaller ones intermixed; pyloric cæca extremely numerous; air bladder small; branchiostegals 7. This genus contains a single species which belongs to the Californian fauna. Its nearest relative seems to be the Australian genus *Atypichthys,* Günther, which has a different fin formula (D. XI, 15; A. III, 15), and the middle dorsal spines much longer, about $\frac{1}{2}$ of head. These fishes show some analogies to the *Chætodontidæ* in form and dentition and in the scaling of the fins. The osteology is, however, much as in *Kyphosus* and *Girella,* and is essentially Percoid. The post-temporal is short and thick, not anchylosed in the skull. (Spanish *medialuna*—half moon, the vernacular name of the typical species in California.)

1769. MEDIALUNA CALIFORNIENSIS (Steindachner).

(MEDIALUNA; HALF MOON.)

Head $3\frac{2}{3}$; depth $2\frac{1}{4}$; eye small, 5 in head, $1\frac{1}{3}$ in snout. D. IX–I, 22; A. III, 19; scales 9–58–12. Body ovate-elliptical, its outlines regular; head bluntish, rounded, the profile strongly convex; maxillary narrow, not reaching front of eye; preorbital narrow; mouth small, terminal, horizontal; jaws with broad bands of slender teeth, the outer compressed, narrowly lanceolate, without evident roots behind; outer teeth similar, growing smaller backward, all somewhat movable; vomer, palatines, and tongue with patches of minute teeth; gill rakers slender, rather long, about 6+17; preopercle entire. Dorsal spines low, the middle spines highest, scarcely longer than eye; soft dorsal low, not elevated in front, little higher than spines; anal low; caudal lunate, the upper lobe slightly longer; pectorals short and narrow; ventrals rather small; scales thinnish, adherent, with smaller ones intermixed; sides, top of head, and jaws closely scaled. Color blackish, with steely luster; paler, and often mottled below; sides with faint oblique vertical lines of spots; fins blackish. Coast of southern California, from Point Conception southward to Cerros Island. This handsome fish is abundant on the rocky coasts of southern California. It reaches a length of about a foot, and is a food-fish of good quality.

Scorpis californiensis, STEINDACHNER, Ichth. Beitr., III, 19, 1875, San Diego; JORDAN & GILBERT, Synopsis, 562, 1883, and elsewhere.

Cæsiosoma californiense, JORDAN, Cat. Fish. N. A., 92, 1885.

Medialuna californiensis, JORDAN & FESLER, *l. c.*, 537, 1893.

Family CLV. SCLÆNIDÆ.

(The Croakers.)

Body compressed, more or less elongate, covered with rather thin scales which are usually more or less ctenoid. Lateral line continuous, usually more or less concurrent with the back, extending on caudal fin. Head prominent, covered with scales; bones of the skull cavernous, the muciferous system highly developed, the surface of the skull, when the flesh is removed, very uneven. Suborbital bones without a backward projecting "stay." Chin usually with pores, sometimes with barbels. Mouth small or large, the teeth in one or more series, the outer of which are sometimes enlarged; canines often present. No incisor nor molar teeth; no teeth on vomer, palatines, pterygoids, nor tongue. Maxillary without supplemental bone, slipping under the free edge of the preorbital, which is usually broad. Premaxillaries protractile, but not very freely movable. Nostrils double. Pseudobranchiæ usually large, present in most of the genera. Gills 4, a slit behind fourth. Gill rakers present. Branchostegals 7. Gill membranes separate, free from the isthmus. Lower pharyngeals separate or united, often enlarged, the teeth conic or molar. Preopercle serrate or not. Opercle usually ending in 2 flat points. Dorsal fin deeply notched or divided into 2 fins, the soft dorsal being the longer, the spines depressible into a more or less perfect groove. Anal fin with 1 or 2 spines, never more than 2. Ventral fins thoracic, I, 5, below or behind pectorals. Pectoral fins normal. Caudal fin usually not forked. Ear bones or otoliths very large. Pyloric cæca usually rather few. Air bladder usually large and complicated (wanting in *Menticirrhus*). Most of the species make a peculiar noise, called variously croaking, grunting, drumming, and snoring; this sound is supposed to be caused by forcing the air from the air bladder into one of the lateral horns. An important family of 30 genera and 150 species, found on sandy shores in all warm seas, a few species being confined to fresh waters. None occurs in deep water and none among rocks. Many of them reach a large size, and nearly all are valued for food. All are carnivorous and some are of interest as game fishes.* (*Sciænidæ*, Günther, Cat. Fishes, II, 265–318.)

We begin our series of *Sciænidæ* with the genus *Seriphus*, which is perhaps most primitive of the existing genera, and we close it with *Eques*, which stands at the opposite extreme from *Seriphus*. In passing down the series from *Nebris* and *Odontoscion*, the most *Otolithus*-like of the *Sciæninæ*, to *Sciæna, Menticirrhus, Eques*, and the other extreme forms, we find no very sharp line of division. The middle line, if we may so speak, lies between *Bairdiella chrysoleuca* and *Ophioscion scierus*, two species really closely allied to each other.

The *Sciæninæ* constitute an irregularly graduated series, the characters changing by small and often scarcely perceptible gradations from the forms allied to *Cynoscion* on the one hand to those approaching *Eques* on the other.

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* A review of the *Sciænidæ* of America and Europe has been published by Jordan & Eigenmann, Report U. S. Fish Comm. for 1886 (1889), 343–446, pls. 1–4.

Nothing could be more unnatural or more ineffective than the subdivision adopted by Cuvier, whereby the *Sciæninæ* without barbels are divided into 3 groups, *Corvina, Johnius,* and *Sciæna,* solely on the strength of the second anal spine. This is large in *Corvina,* very feeble in *Sciæna,* and intermediate in *Johnius.* Günther's arrangement, by which the species referred to *Johnius,* are divided between *Corvina* and *Sciæna,* is no better, as very many of the species have this spine neither large nor small, and could as well be placed in the one group as the other. Bleeker divides this group into *Pseudosciæna,* species with the mouth oblique and the jaws subequal, the lower jaw with the teeth of the inner row enlarged, and *Johnius* with the mouth horizontal and the lower jaw included, the teeth of the lower jaw being in villiform bands. This arrangement is better than the other only in theory. The characters chosen are of more value as indicating relationship, but they can not be applied in practice, as there are intermediate gradations of all sorts. The type of *Pseudosciæna* (*Sciæna aquila*) is in fact much more nearly related to the type of *Johnius* than to most of the species associated with in in *Pseudosciæna.*

As we proceed along the series of *Sciæninæ* from *Larimus* toward *Menticirrhus,* the following changes are notable: In the *Larimus* type the pores on the snout are small and few, and there are no distinct slits or lobes on the snout above the upper jaw; in the other type the pores become large and conspicuous, 4 to 6 in number, and the thickened snout above the upper jaw has two slits on each side, bounding two dermal lobes. The mouth becomes smaller, narrower, more horizontal as we proceed toward *Menticirrhus,* the lower jaw shorter, and the bands of teeth in both jaws more and more broad, those in the lower more decidedly villiform; the pores on the chin become larger and more numerous, the number rising from 2 to 5; the lower pharyngeals become larger, and their teeth larger and less acute; the preorbital becomes wider and more gibbous, the gill rakers, shorter, fewer, and more like tubercles; the anal fin is placed farther forward, and the spines of the fins generally are less slender; the scales, as a rule, become rougher and the rows of scales less regular in their direction. The flesh, as a rule, becomes firmer, coarser, less agreeable in flavor, and of less value as food; but this, like some other characters mentioned above, is subject to much variation. It may be noted that in some *Sciænidæ* the middle rays of the caudal are more produced in young specimens. In some, also, the serrations on the preopercle become weaker or even obsolete with age. (*Sciænidæ,* Günther, Cat., II, 265–318.)

OTOLITHINÆ:

I. Vertebræ 14 or 15 + 10 or 11, the abdominal portion of the spinal column having always more vertebræ than the caudal portion, the anal fin being posterior in its insertion; body more or less elongate, the mouth large, the lower jaw projecting, the preopercle with a crenulate, membranaceous border; snout without distinct pores or slits; no barbels; preorbital narrow; gill rakers slender, moderate, or rather long; anal fin with 1 or 2 very weak spines, the second closely connected with the first soft ray; scales small, smoothish.

- *a.* Anal fin long, of 15 to 21 soft rays, its length more than half that of soft dorsal; dorsal fins more or less separated; soft dorsal and anal fins closely scaled.
  - *b.* Teeth small, sharp, subequal, uniserial below, in a narrow band above; no canines; anal and soft dorsal with 20 to 22 rays each, the former but little

shorter than the latter; dorsal fins well separated; body compressed; scales large, ctenoid; lateral line straight; gill rakers long and slender; caudal fin lunate. SERIPHUS, 569.

bb. Teeth larger, very unequal; tip of upper jaw with one or two strong canines; enlarged teeth or canines on sides of lower jaw; anal fin ¼ shorter than soft dorsal, with 15 to 18 soft rays; dorsal fins well separated, the interspace about equal to eye; soft dorsal of 24 rays; body compressed; scales rather small, cycloid. ISOPISTHUS, 570.

aa. Anal fin moderate, or short, of 7 to 13 soft rays, its length less than ½ that of second dorsal; dorsal fins contiguous; lateral line arched in front.

c. Canine teeth, if present, not lance-shaped, tapering from base to tip.

d. Lower jaw without canines at its tip, some of its lateral teeth sometimes enlarged; tip of upper jaw usually with canines.

e. Mouth very oblique, the lower jaw little projecting, the angle at base of mandible very prominent; body compressed. BUCCONE, 571.

ee. Mouth little oblique, the lower jaw projecting at tip; angle at base of mandible little prominent; body subfusiform. CYNOSCION, 572.

cc. Canine teeth lance-shaped, widened toward the tip, then abruptly pointed; canines of front of premaxillary largest; about 2 canines on front of lower jaw on each side; outer teeth of upper jaw enlarged, somewhat lance-shaped; outer teeth of lower jaw compressed; air bladder with 2 horn-like processes; gill rakers moderate, slender; soft dorsal and anal fin scaly. SAGENICHTHYS, 573.

II. Vertebræ 9 to 12 + 13 to 20, typically 10 + 14, the number in the abdominal part of the body being always less than in the caudal part; dorsal fins contiguous, the soft dorsal being long, much longer than the anal.

f. Dorsal spines well separated, the first dorsal spine attached to the third or fourth interneural, not more than 2 of the spine-bearing interneurals being placed between the same pair of vertebræ; soft rays of dorsal fin usually 17 to 32 (37 to 40 in *Lonchiurus*, 45 to 50 in *Sciænoides*); occipital crest not greatly elevated.

SCIÆNINÆ:

g. Lower pharyngeals separate.

h. Lower jaw without barbels.

i. Caudal fin moderately scaly, its distal portion usually more or less naked, the scales not numerous enough to give a thickened appearance to the fin.

j. Teeth well developed, permanent in both jaws.

k. Lower pharyngeals rather narrow, their teeth conic and mostly sharp, none of them molar; outer teeth of upper jaw more or less enlarged.

l.[*] Gill rakers comparatively long and slender; mouth more or less oblique; anal fin usually (but not always) inserted posteriorly; preorbital usually narrow, flat; edge of snout above upper jaw with the pores and slits little conspicuous or obsolete.

m. Skull excessively cavernous, soft and spongy to the touch, the interorbital space very broad; eye very small; mouth large, oblique; preopercle with a broad membranaceous border, which is striated and fringed; scales small; spinous dorsal short and weak; anal spines weak; caudal fin pointed.

n. Pseudobranchiæ present; teeth subequal, all villiform, in narrow bands; soft dorsal long, of 30 to 35 rays; anal fin rather long; soft dorsal and anal scaly; lower jaw projecting; vertebræ 10 + 14; gill rakers long and slender; air bladder with two horns. NEBRIS, 574.

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[*] This character like many others passes away by degrees, leaving no sharp division between *l* and *ll*.

mm. Skull firm, not excessively cavernous, interorbital space less broad; preorbital not turgid; soft dorsal of less than 30 rays.

o. Scales of the lateral line considerably enlarged, almost entirely concealed by smaller ones; anal fin small, inserted well forward its first spine usually as near ventrals as caudal; caudal fin pointed, its peduncle long and slender; soft dorsal and anal scaly; scales small; preopercle without bony serræ; pseudobranchiæ small, often obsolete on one side. (Fluviatile species.) PLAGIOSCION, 575.

oo. Scales of the lateral line similar to the others, not concealed by smaller ones; anal fin inserted more or less posteriorly, first spine usually nearer caudal than ventrals; caudal peduncle rather short; pseudobranchiæ well developed.

p. Head not very broad, the interorbital space not notably spongy nor deeply cavernous.

q. Preopercle with its membranaceous edge entire, crenulate or ciliate, with no bony teeth; teeth in lower jaw in few series.

r. Teeth very small, equal, uniserial or very nearly so; snout very short; cleft of mouth oblique or even vertical, the lower jaw projecting. LARIMUS, 576.

rr. Teeth larger, more or less unequal, those of the lower jaw in one or two series or in bands; cleft of mouth not vertical.

s. Upper jaw with some of the teeth enlarged, forming canines; some canines in lower jaw; lower jaw projecting. ODONTOSCION, 577.

ss. Upper jaw with a narrow band of teeth, those of the outer row more or less enlarged; no distinct canines. CORVULA, 578.

qq. Preopercle with its bony margin armed with sharp teeth or serræ.

t. Preopercle with its lowermost spine directed abruptly downward; soft dorsal and anal fin moderately scaly.

u. Lower jaw with a few slender canines; second anal spine very small. ELATTARCHUS, 579.

uu. Lower jaw without canines; second anal spine moderate or large. BAIRDIELLA, 580.

pp. Head very broad above, the interorbital space flattish, excessively cavernous, the septa reduced to thin partitions; soft dorsal and anal fin usually densely scaly; second spine of dorsal usually thickened. STELLIFER, 581.

ll. Gill rakers comparatively short and thick, usually not longer than posterior nostril; anal fin inserted farther forward; snout above lower jaw with large pores, and with two more or less distinct slits on its edge, these sometimes obsolete; preorbital more or less broad; mouth more or less inferior.

v. Preopercle with its bony margin armed with strong persistent spines which do not disappear with age; caudal fin not lunate, the middle rays longer than the lower. OPHIOSCION, 582.

vv. Preopercle with its bony margin serrate in the young, becoming entire with age; caudal fin truncate or lunate, the middle rays not longest; slits and pores of upper jaws well developed. SCIÆNOPS, 583.

vvv. Preopercle without bony serratures, its membranaceous edge entire or crenate, or fringed; slits and pores of upper jaw well developed. SCIÆNA, 584.

kk. Lower pharyngeals very broad, with coarse blunt molar teeth; teeth in both jaws subequal, in broad bands; preopercle with its bony margin coarsely serrate; lower jaw included; snout with pores and slits as in *Sciæna*; gill rakers rather short and slender. RONCADOR, 585.

jj. Teeth very small, subequal, those in the lower jaw wanting or deciduous; lower pharyngeals rather broad, with paved teeth; mouth small, inferior; snout as in *Sciæna;* preopercle entire; anal fin long, with about 12 soft rays; gill rakers shortish, rather slender. LEIOSTOMUS, 586.

hh. Lower jaw with one or more barbels, either at the symphysis or on the rami; snout with slits and pores as in *Sciæna;* lower jaw included; preorbital broad; lower teeth in villiform bands; gill rakers more or less short.

w. Pseudobranchiæ well developed; pectoral fin not elongate.

x. Lower jaw with slender barbels, usually several in number.

y. Barbels mostly in a tuft at the symphysis of lower jaw; mouth very small, inferior; gill rakers minute, thickish; dorsal spines X or XI; preopercle sharply but finely serrate; preorbital turgid and cavernous, more or less translucent; caudal fin rhombic. (Fluviatile species.) PACHYPOPS, 587.

yy. Barbels chiefly lateral, along the rami of the lower jaw, usually none at the symphysis; lower pharyngeals narrow, with sharp teeth.

z. Preopercle without bony serræ; dorsal spines XIV; gill rakers short, but rather slender. GENYONEMUS, 588.

zz. Preopercle with its bony margin armed with strong teeth; dorsal spines X or XI; gill rakers short, thickish. MICROPOGON, 589.

xx. Lower jaw with a single thickish barbel at its tip.

a'. Air bladder large; anal spines 2; back more or less elevated; preopercle with its bony margin crenate or serrate; pectorals short, shorter than ventrals. (Free swimming species.) UMBRINA, 590.

aa'. Air bladder none; anal spine single, weak; back not elevated; preopercle with its membranaceous edge crenulate; pectoral fins long, longer than ventrals. (Bottom fishes.) MENTICIRRHUS, 591.

ww. Pseudobranchiæ obsolete; body long and low; caudal pointed; pectoral fin elongate; preopercle without bony serratures.

b'. Mandible with a row of slender barbels along its inner edge; chin without large barbels. PARALONCHURUS, 592.

bb'. Mandible without barbels along the inner edge. Chin with two short barbels; soft dorsal with 30 to 40 rays. LONCHIURUS, 593.

APLODINOTINÆ:

gg. Lower pharyngeals very large, completely united, covered with coarse blunt paved teeth; lower jaw included; snout with slits and pores, as in *Sciæna;* gill rakers rather short.

c'. Lower jaw with numerous barbels along the inner edge of the rami; preopercle nearly entire. (Marine species.) POGONIAS, 594.

cc'. Lower jaw without barbels; preopercle slightly serrate. (Freshwater species.) APLODINOTUS. 595.

EQUITINÆ:

ff. Dorsal spines close together, the first spine attached to the first interneural, and from 5 to 12 of the spine-bearing interneurals wedged in between the high occipital crest and the neural spine of the second vertebra on the one hand, and that of the third vertebra on the other; occipital crest much elevated. Mouth small, low, included; the teeth subequal, in villiform bands; air bladder simple; preopercle with its membranaceous edge serrulate; gill rakers short; snout above premaxillary with slit and pores essentially as in *Sciæna;* anal fin small; soft dorsal very long, of 36 to 55 rays; vertebræ 10 + 15 = 25. EQUES, 596.

569. SERIPHUS, Ayres.

Seriphus, AYRES, Proc. Cal. Ac. Sci., II, 1861, 80 (*politus*).

Body oblong, compressed, covered with rather large, deciduous, ctenoid scales. Head deep, compressed, carinated behind, depressed above the eye; snout bluntish, lower jaw projecting; mouth large, oblique. Teeth small, sharp, separated, in narrow bands. Gill rakers long; pseudobranchiæ present; preopercle with its membranaceous edge denticulated. Fins fragile, the soft parts scaly; dorsal fins well apart, the second unusually small, shorter than the anal, which is unusually large; anal spines 2, feeble; caudal fin lunate. Vertebræ 14 + 10, as in *Otolithus* and *Cynoscion*. Size small. One species in the eastern Pacific. (*σέριφος*, an island in the Grecian Archipelago; a small winged insect; also a kind of wormwood; the allusion in any case not evident.)

1770. SERIPHUS POLITUS, Ayres.

(QUEENFISH; WHITE CROAKER.)

Head 3¼; depth 4; eye large, 4½ in head; snout projecting, 3½ in head. D. VIII-I, 20; A. II, 21 or 22; scales 8-65-9. Body moderately elongate, compressed; profile slightly depressed over the eyes; mouth large and narrow, the lower jaw more or less projecting in the adult; premaxillary anteriorly about on the level of the lower margin of the pupil; maxillary

2 in head, reaching to below posterior margin of eye; lower jaw with a knob at its symphysis which fits in a notch in the upper jaw; teeth all small, subequal, those of the lower jaw in a single series, except at the symphysis, where there are two or three series; teeth of the upper jaw in two series, the inner ones much recurved; gill rakers long and slender, ⅔ length of eye, 7 + 16; lower pharyngeals narrow, linear, fragile; scales moderate, weakly ctenoid, those about the head cycloid; lateral line straight; dorsal spines weak, the highest 2⅗ to 3 in head; soft dorsal falcate, the anterior rays much the longer; anal similar, its base at least as long as that of the soft dorsal; interspace between dorsals 2½ in head; ventrals 2 in head; pectorals 1⅔; caudal lunate. Color bluish above, sides and belly bright silvery, finely punctate; vertical fins all bright yellow; in life, base of pectorals blackish. Coast of southern California, from Point Conception to Cerros Island; common on sandy shores, about San Diego in shallow waters. It reaches the length of about a foot, and is an excellent pan fish. (*politus*, polished.)

Seriphus politus, AYRES, Proc. Cal. Ac. Nat. Sci., II, 1861, 80, no locality; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 456; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 48; JORDAN & GILBERT, Synopsis, 582, 1883; JORDAN & EIGENMANN, *l. c.*, 352, 1889.

570. ISOPISTHUS, Gill.

Isopisthus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 18 (*parvipinnis*).

This genus is intermediate between *Seriphus* and *Cynoscion*. It has the canine teeth of the latter, with the long anal and short second dorsal of the former. The second dorsal has 24 rays; it is well separated from the spinous dorsal, and its base is only ¼ longer than that of the anal. Another genus (*Archoscion* Gill) is intermediate between *Isopisthus* and *Cynoscion*, having the anal shorter and the dorsals closer together than in *Isopisthus*, but less so than in *Cynoscion*. Canines strong, the lateral teeth of lower jaw more or less canine-like. The separation of these groups as genera is perhaps hardly justified. Species few, in tropical America. (*ἴσος*, equal; *ὄπισθε* behind, the soft dorsal and anal equal.)

a. Anal rays II, 19; pectorals rather long, 1⅓ in head; axil brownish. REMIFER, 1771.
aa. Anal rays II, 16 or 17; pectorals shortish, 1½ in head; axil pale. PARVIPINNIS, 1772.

1771. ISOPISTHUS REMIFER, Jordan & Gilbert.

Head 3¼ (3¾ in total); depth 4⅕ (4¾); eye 4½. D. VIII–I, 20; A. II, 19; scales 15–73–16, about 55 pores. Body elongate, compressed, the back not elevated; head compressed; snout rather short, not prominent; anterior profile slowly rising from snout to front of dorsal; premaxillaries extending beyond front of snout, anteriorly on the level of the upper part of the pupil; mouth large, very oblique, the maxillary extending to below the middle of eye, its length 2⅕ in head. Lower jaw strongly projecting at tip; chin without pores. Front of premaxillaries with a long, sharp, curved canine on each side (1 of these often smaller or absent); sides of upper jaw with smaller teeth, wide-set, mostly in 1 row; lower jaw with about 2 series of small, slender teeth in front, laterally with a single series of small teeth, besides 3 to 6 large canines, much smaller than the canines of the upper jaw. Preorbital narrow, not wider than the pupil. Eye large, slightly shorter than snout, which is about equal to interorbital width. Preopercle with a membranaceous flap at its angle, which is striate and slightly fringed at its edge. Gill rakers rather strong and slender, few in number; pseudobranchiæ well developed; nostrils small, the posterior vertically oblong. Scales small, nearly smooth, deciduous; dorsal and anal fins closely covered with small scales; lateral line little arched, becoming straight behind vent; first dorsal small, its spines slender, the highest 2½ in length of head, first spine minute or obsolete, the second not much shorter than third; space between dorsal fins about equal to diameter of eye, 3½ in head; soft dorsal moderate, its longest ray a little less than ⅓ length of head; caudal shortish, slightly double-concave, its middle rays about ½ length of head; base of anal ⅔ length of head, its spines rudimentary; ventrals ½ length of head, reaching halfway to vent, which is close in front of anal; pectorals reaching considerably beyond tips of ventrals, their length 1¼ to 1⅓ in head, 4⅙ to 4⅓ in body. Flesh comparatively soft. Color in life: Bluish-gray above; grayish-silvery below; top of snout and tip of lower jaw blackish; inside of mouth yellow, with black on lower lip within; linings of opercles black, bordered with pale orange; dorsals, caudal, and pectorals with fine black punctulations, the ground color in all except the spinous dorsal faintly yellowish; anal white, the anterior part and the tips of most of the rays yellowish, punctate with black; ventrals white, immaculate; a dark blotch behind orbit and another on upper rays of pectoral within. This species is extremely close to *I. parvipinnis*, differing only in the characters above mentioned. Panama; on sandy shores; rather common. (*remus*, oar; *fero*, I bear, from the long pectorals.)

Isopisthus remifer, JORDAN & GILBERT, Bull. U. S. Fish. Comm. 1881, 320, Panama. (Type, No. 29169, U. S. N. M. Coll. Gilbert.)

Archosion remifer, JORDAN & EIGENMANN, *l. c.*, 353, 1889.

1772. ISOPISTHUS PARVIPINNIS (Cuvier & Valenciennes).

Head 3½; depth 3⅘. D. VIII-I, 21; A. II, 16 or 17; scales about 100, -52 to 54 pores. Body much compressed; pectorals shortish, the upper rays longest, 1½ in head; upper canines very long, recurved; three canines on the sides of the lower jaw; base of soft dorsal 1¼ times length of base of anal; distance between dorsals about equal to diameter of eye; caudal fin subtruncate; color dark plumbeous above, rest of body yellowish-white; no axillary spot; an indistinct elongate dark blotch from behind the eye to middle of opercle. Coast of Brazil, north to Cayenne. Only the original type of this species in the Museum of Paris has been examined by us. This seems to be identical with the species well figured by Steindachner under the name *Isopisthus affinis*, and from Steindachner's description and figure our account has been chiefly drawn. (*parvus*, small; *pinna*, fin.)

Ancylodon parvipinnis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 84, 1830, Cayenne; GÜNTHER, Cat., II, 312, 1860.

Isopisthus affinis, STEINDACHNER, Denksch. Mat. Nat. Kais. Acad. Wiss. 1879, 43, pl. 2, fig. 2, Porto Alegre.

Isopisthus parvipinnis, JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 289; reexamination of type.

Archoscion parvipinnis, JORDAN & EIGENMANN, *l. c.*, 353, 1889.

571. BUCCONE, Jordan & Evermann.

Buccone, JORDAN & EVERMANN, Check-List, 394, 1896 (*prædatorius*).

This genus is close to *Cynoscion*, differing from it chiefly in the form of the mouth, which is large, oblique, the lower jaw less projecting and less produced at symphysis; it is also very deep at base, the articulation of the mandible making a marked angle with the ventral outline; body much more compressed than in *Cynoscion*, the lateral line more strongly arched. Pseudobranchiæ small, sometimes obsolete on one side. One species. (*Bocone*, the Spanish name, from *boca*, mouth: Latin *bucco, bucconis*, wide-mouthed.)

1773. BUCCONE PRÆDATORIA (Jordan & Gilbert).

(BOCONE.)

Head $3\frac{1}{2}$; depth 4; eye $7\frac{1}{2}$ in head; snout $4\frac{2}{3}$. D. IX–I, 19; A. I, 9; scales about 65. Mouth large, extremely oblique, the maxillary reaching considerably beyond eye, its length $2\frac{1}{4}$ in head; body robust, deeper, heavier, and with the back more elevated than in any species of *Cynoscion*; anterior profile depressed above the eye, so that the snout projects; snout short, not very acute, head thicker than in other species, the interorbital space equal to length of snout; maxillary very broad, its tip 6 in head; canines 2, short and stout; lateral teeth of lower jaw moderate; gill rakers $x + 10$, rather long and slender, the longest $\frac{3}{4}$ eye; pseudobranchiæ often obsolete on one side; dorsal spines high, the longest $2\frac{1}{10}$ in head; soft dorsal moderately scaly, the distal half of its rays largely naked; middle rays of caudal produced; pectorals $1\frac{1}{2}$ in head; ventrals a trifle shorter. Color pale, bluish above, silvery below; axil and inside of opercle a little dusky. Coast of Panama. The types and cotypes, three specimens, the largest nearly 2 feet in length, at Cambridge. Numerous others have been since taken by Dr. Gilbert. (*prædatorius*, predatory.)

Cestreus prædatorius, JORDAN & GILBERT, in JORDAN & EIGENMANN, Review of the Sciænidæ, 363, 1889, Panama. (Type, No. 10901, M. C. Z. Coll. Agassiz.)

572. CYNOSCION, Gill.

(WEAK-FISHES.)

Cestreus, GRONOW, Cat. Fish., Ed. Gray, 49, 1854 (*carolinensis* = *nebulosus*): preoccupied by *Cestreus*, MCCLELLAND, Journ. Nat. Hist., II, 1851, 1842, an East Indian genus of gobies = *Prionobutis*, BLEEKER.

Cynoscion, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 18 (*regalis*).

Apseudobranchus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 18 (*toeroe* = *acoupa*).

Atractoscion, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 18 (*æquidens*).

Body elongate, little compressed, the back not elevated. Head conical, rather pointed; mouth very large, terminal, not very oblique, the lower jaw projecting, the symphysis produced, the angle at base of maxillary not prominent. Maxillary very broad. Teeth sharp, not closely set, in rather narrow bands; tip of the lower jaw without canines; upper jaw with 2 long canines, 1 of which is sometimes obsolete; canines tapering from base to tip; lateral teeth of lower jaw larger than anterior. Preopercle with its membranaceous edge serrulate, the bone entire. Lower pharyngeal bones separate, their teeth all pointed. Gill rakers strong, rather long. Vertebræ about 14 + 10 (instead of 10 + 14 as in Sciænoids generally). Pseudobranchiæ well developed; dorsal spines slender, the fins closely contiguous; anal spines 1 or 2, very feeble, the soft rays 7 to 13; second dorsal long and low, more than twice length of anal; ventrals inserted below pectorals, the pubic bone long and strong; caudal fin subtruncate or lunate. Large fishes chiefly of the waters of America, closely related to the Old World genus *Otolithus*, from which they are distinguished by the absence of canines in the lower jaw. All of them rank high as food fishes; the flesh is rich, but in some species tender and easily torn; hence the popular name Weak-fishes. (*κύων*, dog; *σκίον*, *Sciæna;* the modern Greek name of *Umbrina cirrhosa.*)

CYNOSCION:

- *a.* Scales not very small, the lateral line having 55 to 75 pores, the number of transverse series ranging from 55 to 85, being not much in excess of the number of pores: head compressed, not truly conical; upper jaw with distinct canines, the band of teeth in the upper jaw rather narrow, the lower teeth small and in few series in front, larger and uniserial on the sides.
  - *b.* Soft rays of the dorsal and anal more or less closely scaled; gill rakers comparatively long and slender, 9 to 12 on the lower part of the arch, the longest at least $\frac{1}{2}$ the diameter of the eye.
    - *c.* Soft dorsal of 20 to 23 rays.
      - *d.* Caudal fin rhombic, the middle rays considerably produced.
        - *e.* Snout short, bluntish, $4\frac{3}{5}$ in head; mouth small, little oblique, the canines quite small; color pale, with faint darker streaks; axil pale, pseudobranchiæ sometimes wanting. D. IX–I, 20; A. I, 8. ACOUPA, 1774.
        - *ee.* Snout long, about $3\frac{1}{2}$ in head; maxillary reaching beyond eye; pectoral shortish, $1\frac{2}{3}$ in head; color uniformly silvery; axil brown. D. VIII–I, 21 or 22; A. II, 10. SQUAMIPINNIS, 1775.
      - *dd.* Caudal fin deeply lunate; the middle rays shorter than the upper ones; coloration plain; maxillary reaching beyond eye. D. IX–I, 23; A. II, 10. OTHONOPTERUS, 1776.
    - *cc.* Soft dorsal of 26 to 29 rays; caudal fin subtruncate or double-truncate, the middle rays but slightly produced.
      - *f.* Coloration nearly uniform silvery.
        - *g.* Caudal truncate; body slender, the depth more than 4 in length; snout short; maxillary not reaching beyond eye. D. X–I, 27; A. I, 11. OBLIQUATUS, 1777.
        - *gg.* Caudal weakly double-concave; body deep, the depth $3\frac{1}{2}$ to $3\frac{3}{4}$ in length.
          - *h.* Snout long, $3\frac{3}{4}$ in head, longer than eye. JAMAICENSIS, 1778.
          - *hh.* Snout short, $4\frac{1}{2}$ in head, shorter than eye. D. X–I, 27 to 29, A. II, 9 or 10. NOTHUS, 1779.
      - *ff.* Coloration brownish silvery above, with many dark brown spots, arranged in undulating streaks; body more or less compressed; eye moderate, 5 to 7 in head; maxillary extending to below posterior margin of eye, $2\frac{1}{6}$ in head; canines large; color brownish silvery, with iridescent reflections, and marked with many small, rather irregular dark-brown spots, some of which form undulating lines running upward and backward; upper fins dusky, lower yellowish.

i. Snout not very sharp, about $4\frac{1}{4}$ (4 to $4\frac{1}{3}$) in head; gill rakers long and slender, usually $5+10$ to 12 in number; membranes of soft dorsal and anal more or less closely scaly, the scales readily deciduous. REGALIS, 1780.

ii. Snout very sharp, $3\frac{3}{4}$ to $3\frac{1}{5}$ in length of head; gill rakers shorter, rather slender, $4+8$ or 9 in number; membrane of soft dorsal and anal with very few scales, these readily deciduous. THALASSINUS, 1781.

bb. Soft rays of the dorsal and anal scaleless; gill rakers comparatively short and thickish, usually not longer than pupil, and but 6 to 8 on lower limb of the arch.

j. Coloration not uniform, grayish and silvery, the back with distinct darker spots, lines, or reticulations; caudal fin truncate, or slightly double-concave.

k. Soft dorsal immaculate; back and sides covered with dark-brown streaks and reticulations which obscure the ground color, especially above the lateral line; lateral line in a pale streak, bordered above and below by a darker one; lower parts silvery; fins unspotted; body deep; snout not sharp, pectorals $1\frac{2}{3}$ in head. D. X–I, 28; A. II, 9. RETICULATUS, 1782.

kk. Soft dorsal fin with conspicuous round black spots; back and sides covered with similar spots smaller than the pupil, larger than those on the fins; snout acute, much longer than eye; pectoral $2\frac{1}{4}$ in head. D. X–I, 25 to 27; A. II, 10. NEBULOSUS, 1783.

jj. Coloration nearly uniform, bluish gray above, silvery below; no distinct spots, on body or fins.

l. Caudal fin somewhat lunate in the adult, the middle rays shortest, although more or less produced in the young; pectoral fin short, not reaching tips of ventrals. D. X–I, 22 or 23; A. II, 10. PARVIPINNIS, 1784.

ll. Caudal fin always double-truncate or double-concave, the middle rays somewhat produced.

m. Pectoral fins reaching nearly or quite to the tips of ventrals, their length more than $\frac{1}{2}$ head.

n. Second dorsal of 20 or 21 rays.

o. Scales small (12–86–x), the number of pores in the lateral line about 70; head rather long, compressed and pointed; body slender; eye large; pectorals $1\frac{2}{3}$ in head. D. IX–I, 20; A. II, 8. XANTHULUS, 1785.

oo. Scales moderate (8–66–18), the pores in the lateral line about 63; head large, bluntish; body robust; snout short, 4 to $4\frac{1}{2}$ in head. D. X–I, 21; A. II, 9. ALBUS, 1786.

nn. Second dorsal of 24 rays; scales rather large, in 85 series, the number of pores about 55; snout sharp, $4\frac{2}{5}$ in head; maxillary $2\frac{1}{2}$ in head; body robust; gill rakers $2+9$; caudal double-truncate; pectorals $1\frac{1}{2}$ in head; color gray, unmarked. MACDONALDI, 1787

mm. Pectoral fins short, reaching little past middle of ventrals, their length not more than $\frac{1}{2}$ head; body elongate; snout sharp, 4 in head. D. X–I, 21; A. II, 9. STOLZMANNI, 1788.

ATRACTOSCION (ἄτρακτος, spindle; σκίον, *Sciæna*):

aa. Scales comparatively small; the number of pores in the lateral line 70 to 90, and very much less than the number of transverse rows, which is from 85 to 150; teeth of upper jaw in a rather broad band, 1 to 4 of them usually more or less canine-like, the canines generally small, and sometimes wholly disappearing with age; lateral teeth of lower jaw not much enlarged; gill rakers usually small and short.

p. Caudal fin lunate or subtruncate; scales not very small; head more or less distinctly conical, not flattened above; soft dorsal with 21 to 23 rays.

q. Soft dorsal wholly scaleless.

r. Pectoral fin rather long, more than ½ head; flesh firm; scales of sides of head not silvery; head pointed; snout long, sharp, 3⅗ in head; caudal lunate; color pale, young with dark cross bands; a dusky spot in axil. D. X, 21 or 22; A. II, 9. NOBILIS, 1789.

rr. Pectoral fins short, not more than ½ length of head; flesh rather soft; sides of head bright silvery; head very regularly conical, pointed, tapering, scarcely compressed; snout very acute; 3⅘ in head; canines quite small, usually but 1 present, and this disappearing with age; eye small, 7½ in head; body slender, subfusiform, moderately compressed. Scales small, all cycloid, those on head embedded and bright silvery; pectorals and ventrals about equal 2 in head; caudal lunate. Color grayish above, with bright reflections; inside of mouth deep orange yellow; lining of opercle black; axil brownish. PHOXOCEPHALUS, 1790.

qq. Soft dorsal fin with its lower portion covered with small, caducous scales. Body compressed; head compound-conic; canines small, both present; pectorals 2 in head; caudal weakly double truncate. D. IX, I, 21 to 23; A. II, 10. LEIARCHUS, 1791.

pp. Caudal fin rhombic or S-shaped, the middle rays produced, the upper lobe usually pointed; soft dorsal with 23 to 28 rays.

s. Soft dorsal entirely naked; anal with a few scales; body long and low, spindle-shaped; head depressed above; mouth large; canines present, short and thick; eye small, caudal S-shaped, the middle rays longest; pectorals 1⅘ in head; scales very small. D. X–I, 28; A. I, 8. VIRESCENS, 1792.

ss. Soft dorsal and anal fins densely scaly throughout; teeth all small, the canines moderate; scales very small; pectoral 1¾ in head; caudal S-shaped; color greenish, silvery below. D. XI–I, 23; A. II, 9. MICROLEPIDOTUS, 1793.

Subgenus CYNOSCION.

1774. CYNOSCION ACOUPA* (Lacépède).

(ACOUPA; TOEROE.)

Head 3⅘; depth 4; eye 5⅗; snout 4⅗. D. X–I, 20; A. I, 8; scales 66. Mouth moderate, not very oblique; the maxillary reaching little beyond eye, its length about 2¼ in head. Snout short, bluntish; mouth smaller and less oblique than in most of the species, the canines quite small; the lateral teeth of lower jaw smaller and more nearly equal than in others; lower jaw a little protruding; maxillary extending to posterior margin of eye, 2¼ in head; gill rakers 3 + 10, long and slender, those near the angle rather long, ⅔ eye, the others rapidly shortened; eye large; soft dorsal and anal scantily scaled, the distal half largely naked, the fins rather high, the longest soft rays 2⅓ in head; caudal pointed; pectorals 1½ in head, not reaching tips of ventrals; color pale, with faint darker streaks along sides of back; axil pale; opercle dusky within. Atlantic coast of

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* The statement is made by Dr. Günther that this species lacks pseudobranchiæ, and on this assertion Dr. Gill has proposed for it the generic name *Apseudobranchus*. It is true in this as in other species of *Cynoscion* that the pseudobranchiæ become smaller with age. Usually they become (in old specimens) obsolete on one side while they are perfectly evident on the other This is the case with all the old specimens of this species which we have examined, and it is true also in several others of the larger species. The genus *Apseudobranchus* is strictly synonymous with *Cynoscion*.

South America, Brazil north to Venezuela; generally common; the specimens here described (10892 M. C. Z.) from Cachiura. (*Acoupa*, a Portuguese name in Guiana.)

Cheilodipterus acoupa, Lacépède, Hist. Nat. Poiss., III, 546, 1802, Cayenne.
Lutjanus cayennensis, Lacépède, Hist. Nat. Poiss., IV, 196 and 245, 1802, Cayenne.
Otolithus rhomboidalis, Cuvier, Règne Animal, Ed. 2, II, 173, 1829, Cayenne; based on *Lutjan de Cayenne*, Lacépède.
Otolithus toeroe, Cuvier & Valenciennes, Hist. Nat. Poiss., V, 72, pl. 103, 1830, Cayenne; same type as *Lutjan de Cayenne*, Lacépède, Surinam; Brazil; Lake Maracaibo; Cuvier & Valenciennes, Hist. Nat. Poiss., IX, 478, 1833.
Otolithus cayennensis, Günther, Cat., II, 309, 1860.
Cynoscion acoupa, Jordan, Proc. U. S. Nat. Mus. 1886, 588.
Cestreus acoupa, Jordan & Eigenmann, *l. c.*, 363, 1889.

1775. CYNOSCION SQUAMIPINNIS (Günther).

Head 3¼; depth 4; eye about 6; snout 3½. D. VIII–I, 21 or 22; A. II, 10; scales 10–70–23. Mouth moderate, not very oblique; snout long; maxillary reaching a little beyond eye, its length about 2½ in head; pectoral shortish, 1⅔ in head; lower jaw very prominent; lateral line becoming straight opposite front of anal; caudal rhombic, its middle rays produced, longer than the outer rays; soft dorsal and anal scaly; gill rakers long and slender about $x+11$; dorsal spines weak, the longest 2½ in head. Color, uniform silvery; sides minutely punctulate; axil brown; ventrals yellowish. Pacific coast of tropical America; known from a few specimens taken at La Union and Panama; those here described in the Museum at Cambridge. (*squama*, scale; *pinna*, fin.)

Otolithus squamipinnis, Günther, Fishes Central America, 387 and 429, 1869, Panama.
Cynoscion squamipinne, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1881, 232.
Cestreus squamipinnis, Jordan & Eigenmann, *l. c.*, 364, 1889.

1776. CYNOSCION OTHONOPTERUS, Jordan & Gilbert.

Head 3⅒; depth 4; eye 6⅔ in head. D. IX–I, 23; A. II, 10; scales 66, 60 pores. Body rather elongate, the back somewhat elevated, the profile from tip of snout to dorsal nearly straight; caudal peduncle rather long and slender, its depth 4 in head. Head long and pointed, compressed, not regularly conical; mouth large, the lower jaw projecting; maxillary broad, reaching to or a little beyond posterior margin of orbit; premaxillaries in front on the level of lower part of pupil; length of gape 2⅓ in head. Teeth in upper jaw in a moderate band which becomes narrower laterally; upper jaw with 2 small canines, their length scarcely ¼ diameter of pupil; some of the other anterior teeth enlarged and larger than the lateral teeth; teeth in lower jaw in a narrow band in front, in a single series laterally, the lateral teeth much larger than the anterior. Eye moderate, broader than preorbital, narrower than maxillary, its diameter a little greater than ½ interorbital space; preopercle with its membranaceous border broad and covered with small scales. Gill rakers long and strong, nearly as long as eye. Scales small, all with conspicuous membranaceous edges; all the fins excepting spinous dorsal completely covered with small scales, the bases of the fins thickened by them; a few scales on front of spinous dorsal; lateral line considerably curved anteriorly, becoming straight at a point in front of the vent, near the origin of the soft dorsal; dorsal spines comparatively long and strong, little flexible, the third spine slightly longer than the second, 2¾ in length of head; first spine short and slender, about ⅓ length of second; dorsals not connected; second dorsal rather high, its longest rays 3½ in head; caudal fin large, lunate, the outer rays about ⅓ longer than the middle rays, which are 2¼ in head; anal large, as long as high, its distal margin perfectly straight, its longest rays about ⅓ length of head; anal spines small, enveloped in the scaly skin, the second about ⅓ height of first soft ray; anal fin terminating considerably in front of dorsal; ventrals long, not reaching quite halfway to vent, their length about ½ that of head; pectorals broad, rather long, reaching a little beyond tips of ventrals, and contained 1¾ in length of head. Slaty-bluish above, silvery below, with bright reflections; body and fins everywhere with dark punctulations; tip of chin dark; fins yellowish, the upper all with dark edging; pectorals blackish on the posterior side, the axil and the large axillary scale dusky; lower jaw bright silvery; lining of opercle dark; peritoneum pale. Length 2 feet. Gulf of California; known from 2 large specimens taken in the Gulf of California. (ὀθόνη, veil; πτερόν, fin, from its scaly dorsal.)

Cynoscion squamipinnis, STREETS, Bull. U. S. Nat. Mus., VII, 49, 1877, off San Ygnacio River, Gulf of California; not *Otolithus squamipinnis*, GÜNTHER.
Cynoscion othonopterum, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 274, Punta San Felipe, Mexico. (Type, No. 29385. Coll. Lieut. Nichols.)
Cestreus othonopterus, JORDAN & EIGENMANN, *l. c.*, 364, 1889.

1777. CYNOSCION OBLIQUATUS (Valenciennes).

Head 3¾; depth 5⅓; eye 5 in head; snout about 5. D. X–I, 27; A. I, 11; scales 60. Caudal truncate; body rather slender; maxillary reaching posterior third of eye; pectoral as long as ventral; coloration uniform silvery; scales of fins undescribed. (Sauvage.) Martinique. This species is unknown to us.* The increased number of dorsal rays leads us to place it in the neighborhood of *C. nothus*, with which species the scanty description agrees in most respects. *C. nothus* has, however, not been recorded from the West Indies. (*obliquatus*, rendered oblique.)

Otolithus obliquatus (VALENCIENNES MS.) SAUVAGE, Bull. Soc. Philom. Paris, III, 1879, 209, Martinique.
Cestreus obliquatus, JORDAN & EIGENMANN, *l. c.*, 365, 1889.

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* The following is the account published by Dr. Sauvage:

"Un *Otolithe* étiquetté dans la collection du Muséum *Otolithus obliquatus* de la main de Valenciennes, n'est pas décrit dans l'Histoire des Poissons. Voisine de l'*Otolithus thalassinus* Holbr., cette espèce en diffère par le moins grand nombre d'écailles a la ligne latérale et l'œil plus grand; la forme de la caudale la sépare de l'*Otolithus nothus* Holbr., des mêmes parages. Voici la diagnose des deux exemplaires recueillis à la Martinique par M. Plée:

"D. X, 28; A. I, 11; L. lat. 60. Hauteur de corps contenue cinq fois un tiers, longueur de la tête trois fois et trois quarts dans la longueur totale du corps; museau un peu plus long que le diamètre de l'œil, que est contenue cinq fois dans la longueur de la tête; mâchoire inférieure plus longue que la supérieure; des canines assez fortes à la mâchoire supérieure seulement; maxillaire arrivant au niveau du tiers postérieur de l'œil; angle du préopercule arrondi et un peu rejeté en arrière; dentelures du préopercule bien visibles, plus fortes à l'angle. Caudale tronquée; pectorales de même longueur que les ventrales. Ligne latérale assez incurvée vers le milieu de sa longueur. Coloration uniforme. Longueur du corps 0.200."

1778. CYNOSCION JAMAICENSIS (Vaillant & Bocourt).

(Mongolar Drummer.)

Head 3; depth 3½ (4⅗ with caudal); eye 4½ in head. D. X–I, 26 or 27; A. I, 9; scales 63; snout 3¾ in head, longer than eye; maxillary to below middle of pupil, 2¼ in head; lower jaw projecting; depth of head over hinder margin of eye, 1¾ in its length. A single large canine in front of upper jaw, 4 or 5 small teeth on side of lower jaw, other teeth few and small; tongue free at end and sides, with a broad median groove; slit of posterior nostril nearly vertical. Gill rakers 3+7, the longest ½ eye. Opercular flap extending beyond upper base of pectoral; preopercle with a membranous margin. Dorsals contiguous; membrane of anal scaled almost to tip, that of dorsal about halfway. Scales weakly ctenoid, those on top of head irregular in size. Pectorals about equal in length to ventrals, 1½ in head; caudal doubly concave, middle rays longest. Curve of lateral line gradual, becoming straight behind the fourth dorsal ray. Color in alcohol, very dark olive above, the entire sides with golden luster, paler below; dorsals, pectorals, and caudal lightly punctate, lower fins colorless. This species is closely related to *Cynoscion obliquatus*, differing in having the caudal doubly concave, and the anal with but 9 rays, and especially in its much more robust form. Jamaica. Here described from 4 specimens 8 to 10 inches long, sent us by Rev. Joseph Seed Roberts, of Kingston, Jamaica.

Otolithus jamaicensis,* Vaillant & Bocourt, Miss. Sci. au Mexique, Poissons, 156, 1874, Jamaica. (Type, No. A, 557, Mus. Paris. Coll. F. Bocourt.)
Cynoscion jamaicensis, Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 114.

1779. CYNOSCION NOTHUS (Holbrook).

(Bastard Weakfish.)

Head 3½; depth 3¾; eye 4; snout 4½. D. X–I, 27 to 29; A. II, 9 or 10; scales 6–58 to 62–7. Caudal weakly double concave; body rather deep; eye very large, equal to interorbital width; body more compressed than in other species, the back somewhat elevated; snout rather short, not very acute, mouth smaller than in related species; maxillary 2⅕ in head, reaching to below posterior margin of pupil; gill rakers long and slender, 4+9, the longest ½ eye; lower pharyngeals very slender; dorsal fins contiguous; membrane of soft dorsal scaled to its tips; scales weakly ctenoid; lateral line much curved anteriorly, becoming straight under seventh dorsal spine. Color grayish silvery, thickly punctulate above and on sides to level of pectorals, then abruptly silvery, a row of dark points

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*The following is the substance of the original account of *Cynoscion jamaicensis:*
Head 4; depth 4⅕. D. X–I, 25; A. II, 9. Scales 6–59–18. Body moderately elevated; lower jaw projecting; snout nearly 3 in head; maxillary reaching nearly to opposite middle of eye; eye equal to interorbital space, 4⅕ in head; preopercle rounded; scales moderate; lateral line rising anteriorly almost to upper fourth of depth of body, becoming median under fourth soft ray of dorsal; soft dorsal scaly. Vent at end of third fifth of total length. Dorsal spines feeble, the fourth longest, nearly ½ head; anal spines very weak, the second 1½ in eye; pectoral 1⅔ in head, reaching tips of ventrals. Caudal shortish, the middle rays longest. No pseudobranchiæ (in type). Color plain silvery in spirits, without markings.
Jamaica; one specimen m. 240 in length. (Vaillant & Bocourt.)

marking the line of division; snout and tip of lower jaw blackish; mouth white within; lower fins white, upper dusky. South Atlantic and Gulf coasts of United States; rather rare at Charleston; a very well marked species, differing in numerous respects from the others, *regalis, thalassinus, nebulosus*, found in the same waters. The specimens here described are from Charleston. (*νοθος*, bastard.)

Otolithus nothus, HOLBROOK, Ichth. S. Carolina, 134, pl. 19, fig. 1, 1860, South Carolina; GÜNTHER, Cat., II, 308, 1860.
Cynoscion nothus, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 131; JORDAN & GILBERT, Synopsis, 580, 1883.
Cestreus nothus, JORDAN & EIGENMANN, *l. c.*, 366, 1889.

1780. CYNOSCION REGALIS (Bloch & Schneider).

(COMMON WEAKFISH; SQUETEAGUE; "SEA TROUT.")

Head 3⅓; depth 4¼; eye about 1⅓ in snout, 5 to 7 in head; snout 4 to 4⅓. D. X–I, 26 to 29; A. II, 11 to 13; scales 6–56–11. Maxillary reaching to beyond pupil, 2⅙ in head; teeth sharp, in narrow bands; canines large. Pectorals short, scarcely reaching tips of ventrals, a little more than ½ length of head; longest dorsal spine as long as maxillary, not ½ length of head; soft dorsal and anal scaly, the scales caducous. Gill rakers long and sharp, 5 + 11 in number. Color silvery, darker above and marked with many small, irregular dark blotches, some of which form undulating lines running downward and forward; back and head with bright reflections; dorsal and caudal fins dusky; ventrals, anal, and lower edge of caudal yellowish, sometimes speckled. Atlantic and Gulf coast of the United States from Cape Cod southward to Mobile; very abundant on sandy shores, not found about rocks. It is highly valued as a food-fish, the flesh being rich and delicate. Its flesh, like that of most species of the genus, is very tender and easily torn, hence the common name Weakfish. On the Carolina coast it has received the very inappropriate name "Sea Trout." The bluefish (*Pomatomus*) is especially destructive to individuals of this species, the two inhabiting the same waters and often taken together. (*regalis*, royal; suggested by the name "Kingfish," which belongs, however, to *Menticirrhus*.)

Johinus regalis, BLOCH & SCHNEIDER, Syst. Ichth., 75, 1801, New York.
Roccus comes, MITCHILL, Report, in part, Fishes New York, 26, 1814, New York.
Labrus squeteague, MITCHILL, Trans. Lit. and Phil. Soc. New York 1815, 396, pl. 2, fig. 1, New York.
Otolithus regalis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 67, 1830.
Cynoscion regale, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 18; JORDAN & GILBERT, Synopsis, 581, 1883.
Cestreus regalis, JORDAN & EIGENMANN, *l. c.*, 366, pl. 1, 1889.

1781. CYNOSCION THALASSINUS (Holbrook).

The form called *Otolithus thalassinus* by Holbrook has not been recognized by later collectors, and it has usually been considered identical with *C. regalis*. A specimen taken by Mr. Silas Stearns at Pensacola seems to answer to Holbrook's description, and we have found 2 similar specimens in the museum at Cambridge, one (No. 438, M. C. Z.) from Pass

Christian, Mississippi, the other from Hampton Roads, Virginia. The only differential characters which we have noted are given above in the analysis of species. *Cynoscion thalassinus* may, perhaps, be found to inhabit a different depth of water than that which the common Weakfish frequents. For the present we may treat the 2 as distinct species. Depth 4⅔; head 3½; D. X–I, 24; A. II, 11; scales 56. Body compressed, not especially elevated, of about the same depth everywhere between the ventrals and the vent; caudal peduncle rather long and stout. Head pointed, subconical; profile straight, scarcely descending; eye rather large, 1⅖ in snout, 5⅓ in head; mouth large, oblique, premaxillary anteriorly on a level with the upper margin of the pupil; maxillary extending beyond the pupil; lower jaw strongly projecting, its tip entering the profile. Teeth of the lower jaw in 2 series, anteriorly in a single series, those in front small and subequal, the inner ones recurved, those of the side much larger; teeth of upper jaw in 2 series, those of the outer series scarcely decreasing in size toward the angle, those of the inner series becoming minute on the sides; canines moderate, ⅓ the diameter of the eye. Preopercle with a striated and dentated dermal margin; gill rakers slender; those near the angle ½ the length of the eye; lower pharyngeals weak and long, grooved below; teeth at the angle several times as large as the rest, all more or less recurved, the anterior ones specially so; teeth of the upper pharyngeals unequal. First dorsal spine inserted above the end of the first fourth of the ventrals, the spines slender, the third highest, reaching to the ninth spine, 2⅔ in head; second anal spine about twice as large as the first, 2⅔ in length of eye; anal rays 2⅔ in head; pectorals broken; ventrals slightly less than 2 in head; soft dorsal apparently not scaly, but so mutilated in our specimen that we can not be certain of this; scales very weakly ctenoid; lateral line somewhat wavy anteriorly, becoming straight under the fourth or fifth dorsal ray. Color brownish above, lighter below; middle of sides with many dark dots; a dark blotch on upper corners of opercle and cheek; axil and inner margin of pectoral black; spinous dorsal black; soft dorsal and caudal dusky; the rest of the fins pale. The specimen from Pass Christian has no scales on dorsal or anal at present, but the marks showing their former presence on the basal parts of the fin are evident. Gill rakers $x+8$, the longest ⅔ eye; snout 3¾ in head. D. X–I, 25; A. I, 10. In the specimen from Hampton Roads the gill rakers are $x+9$; snout 3¼ in head. D. X–I, 25. The coloration is essentially as in *regalis*, but in all these specimens it is more silvery, the dark markings less distinct. Length 12 inches. (*thalassinus*, pertaining to θάλασσα, the sea.)

Otolithus thalassinus, HOLBROOK, Ichth. South Carolina, 132, pl. 18, fig. 2, 1859, Charleston, South Carolina; GÜNTHER, Cat., II, 308.
Cynoscion thalassinus, JORDAN & GILBERT, Synopsis, 581.
Cestreus regalis thalassinus, JORDAN & EIGENMANN, *l. c.*, 366.

1782. CYNOSCION RETICULATUS (Günther).

(CORVINA.)

Head 3½; depth 4⅔. D. X–I, 28; A. II, 9; scales 9–60–15. Body comparatively deep and compressed; head somewhat conical, the snout not very sharp, 3⅔ in head; maxillary extending to below posterior margin of pupil, 2⅗ in head; eye 7 in head; gill rakers shortish, 3+7; ventrals 1⅕ in pectorals; soft rays of dorsal and anal scaleless; pectorals about 1⅔ in length of head; highest dorsal spine about 2⅕ in head; caudal double truncate. Color grayish silvery; back and sides covered with dark-brown streaks and reticulations, which obscure the ground color, especially above the lateral line; lateral line in a pale streak, bordered above and below by a darker one; lower parts silvery; fins unspotted; caudal yellowish orange; inside of mouth deep orange yellow. Length 3 feet. Pacific coast of tropical America, Mazatlan to Panama; a common food-fish on the west coast of Mexico. (*reticulatus*, netted.)

Otolithus reticulatus, GÜNTHER, Proc. Zool. Soc. London 1864, 149, San José de Guatemala, Chiapas; GÜNTHER, Fishes Central America, 387, 388, and 430, 1869.
Cynoscion reticulatum, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 232; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881. 319.
Cestreus reticulatus, JORDAN & EIGENMANN, *l. c.*, 368, 1889.

1783. CYNOSCION NEBULOSUS (Cuvier & Valenciennes).

(SPOTTED WEAKFISH; SPOTTED "SEA TROUT.")

Head 3½; depth 4½; eye small, 6 to 7 in head. D. X–I, 25 to 27; A. II, 10; scales 10–70 to 75–11. Body rather elongate, compressed; snout long, acute, 3¾ in head; lower pharyngeals narrow, each with 7 or 8 series of short teeth, the inner enlarged. Gill rakers short and thick, not longer than pupil, about 4+7 in number; maxillary reaching to posterior edge of eye; canines strong; maxillary, preorbital, and lower jaw naked; longest dorsal spine not quite ½ the length of the head; pectorals short, not reaching tips of ventrals, 2¼ in head; caudal lunate; soft rays of dorsal and anal scaleless. Bright silvery, darker above; back posteriorly with numerous round black spots as large as the pupil; both caudal and dorsal fins marked with similar, somewhat smaller spots, much as in a trout; anal dusky. South Atlantic and Gulf Coast of the United States, New York to Texas; a most excellent food-fish, everywhere common on our Southern coast; rare north of Virginia. The northernmost locality from which we have examined specimens is Beesley Point, New Jersey. (*nebulosus*, clouded.)

Labrus squeteague var. *maculatus*, MITCHILL, Trans. Lit. and Phil. Soc. 1815, 396, New York; not *Labrus maculatus*, BLOCH.
Otolithus nebulosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 79, 1830, locality unknown.
Otolithus carolinensis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IX, 475, 1833, South Carolina; GÜNTHER, Cat., II, 306, 1860.
Otolithus drummondi, RICHARDSON, Fauna Bor.-Am., Fish., 70, 1836, New Orleans; GIRARD, U. S. and Mex. Bound. Survey, Zool., 12, pl. 6. 1859; GÜNTHER, Cat., II, 307, 1860.
Cestreus carolinensis, GRONOW, Cat. Fish., Ed. Gray, 49, 1854.
Cynoscion carolinensis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 377.
Cynoscion maculatum, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 285; JORDAN & GILBERT, Synopsis, 581, 1883; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 233.
Cestreus nebulosus, JORDAN & EIGENMANN, *l. c.*, 368, 1889.

1784. CYNOSCION PARVIPINNIS, Ayres.

(CALIFORNIA "BLUEFISH.")

Head $3\frac{1}{2}$; depth $4\frac{1}{3}$. D. X–I, 22 or 23; A. II, 10; scales 13–75 (pores)–14, about 95 in a longitudinal series; eye 6 in head; highest dorsal spine $2\frac{1}{3}$; pectoral $2\frac{1}{3}$; ventrals 2. Body elongate, shaped much as in the weakfish; maxillary extending beyond pupil, $2\frac{1}{5}$ in head; canine large, usually but a single one present; snout rather sharp, 4 in head; gill rakers shortish, $4+7$; pharyngeals narrow, their teeth small, cardiform, the inner ones somewhat enlarged; soft rays of dorsal and anal scaleless; caudal fin somewhat lunate in the adult, the middle rays shortest, although more or less produced in the young; pectoral fin short, not reaching tips of ventrals. Color clear steel blue above, without stripes or spots; silvery below; a narrow dusky shade along the sides below the lateral line; axil dusky; lower fins yellowish, with dusky shading; upper fins dark; second dorsal dark edged. Pacific coast of North America from Santa Barbara Islands to Guaymas and Mazatlan; common along the coasts of southern California as far north as San Pedro. It is an excellent food-fish, not inferior to its relative, the weakfish of the Atlantic coast. As in the case of the latter species, the flesh of *Cynoscion parvipinnis* is soft, and the fish does not bear transportation well. (*parvus*, small; *pinna*, fin.)

Cynoscion parvipinnis, AYRES, Proc. Cal. Ac. Sci. 1861, 156, coast of Lower California.

Otolithus magdalenæ,* STEINDACHNER, Ichth. Beit., III, 34, 1875, Magdalena Bay, Lower California.

Cynoscion parvipinne, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 456; JORDAN & GILBERT, Synopsis, 580, 1883.

Cestreus parvipinnis, JORDAN & EIGENMANN, *l. c.*, 369, 1889.

1785. CYNOSCION XANTHULUS, Jordan & Gilbert.

(CORVINA DE LAS ALETAS AMARILLAS.)

Head $3\frac{1}{3}$; depth $4\frac{1}{3}$. D. IX–I, 20; A. II, 8. Scales 12–66 (pores) –x, 86 rows of scales. Head rather long, compressed and pointed; maxillary a little less than $\frac{1}{2}$ head, reaching just past eye; lateral line becoming straight opposite the vent; body rather slender, compressed; eye large, 6 in head; premaxillaries in front entirely below eye; canines small, 2 usually present; gill rakers short and thick, not longer than pupil, 6 to 8 on lower limb of arch; longest dorsal spine $2\frac{1}{4}$ in head; longest soft ray $2\frac{2}{3}$; middle rays of caudal considerably produced, $1\frac{1}{2}$ in head; anal spine rather small and stout; ventrals little more than 2 in head; pectoral fins reaching nearly or quite to the tips of ventrals, their length $1\frac{2}{3}$ in head. Scales smaller than in related species. Color bluish above, silvery below; upper parts and especially the middle of the sides punctate with dark points; upper fins dark, their margins dusky, lining of opercle black; inside of mouth bright yellow in life. Caudal yellow. Length 3 feet. Pacific coast

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*The types of *Otolithus magdalenæ*, from Magdalena Bay, are preserved in the museum at Cambridge.

of Mexico, not rare about Mazatlan; a food-fish of some importance. (*ξανθός*, yellow; *οὖλον*, singular of *οὖλα*, the gums.)

Cynoscion xanthulum, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 460, Mazatlan (Type, No. 28109. Coll. Gilbert); JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 107.
Cestreus xanthulum, JORDAN & EIGENMANN, *l. c.*, 369, 1889.

1786. CYNOSCION ALBUS (Günther).

Head $3\frac{1}{2}$; depth 4 to $4\frac{1}{3}$. D. X–I, 21; A. II, 9; scales 8–63 (pores)–18, 66 series of scales. Head large, bluntish, the snout shorter than in *C. stolzmanni*, 4 to $4\frac{1}{2}$ in head; eye $6\frac{1}{4}$; maxillary nearly $\frac{1}{2}$ head, reaching well past eye; gill rakers $\frac{3}{5}$ eye, about 4 + 8. Body rather robust; lateral line becoming straight at a point well in advance of vent; dorsal spines slender, the longest $2\frac{1}{2}$ in head; soft rays of dorsal and anal scaleless; caudal double truncate, the middle rays longer than the head without snout; pectorals nearly reaching tips of ventrals, more than $\frac{1}{2}$ length of head; second anal spine evident. Color white, somewhat bluish above, without markings. Pacific coast of tropical America, not rare at Panama. Like the others of the genus, it is a food-fish of importance. This species is close to *Cynoscion xanthulus*, but the scales are larger. (*albus*, white.)

Otolithus albus, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 149, Chiapas; Panama; GÜNTHER, Fishes Central America, 387 and 429, 1869; STEINDACHNER, Neue u. Seltene Fische k. k. Zool. Mus. Wien, 36, 1879.
Otolithus cayennensis, VAILLANT & BOCOURT, Miss. Sci. Mexique, Poiss., 156, 1874; specimen from La Union; not *cayennensis*, LACÉPÈDE.
Cynoscion album, JORDAN & GILBERT, Bull. U. S. Fish. Comm. 1881, 319.
Cestreus albus, JORDAN & EIGENMANN, *l. c.*, 370, 1889.

1787. CYNOSCION MACDONALDI, Gilbert.

(TOTUAVA.)

Head $3\frac{2}{5}$; depth 4; eye $5\frac{1}{2}$ in head (in young), 12 (in adult); snout $4\frac{2}{5}$. D. IX–I, 24; A. II, 7; scales 13–85 to 90–22, 50 to 55 pores. Snout sharp; lower jaw protruding, mouth moderate, somewhat oblique, the maxillary reaching vertical from middle of orbit, $2\frac{2}{5}$ to $2\frac{3}{5}$ in head. No enlarged canines on either jaw; teeth in front of premaxillaries mainly in 2 distinct rows, uniting laterally to form a narrow band, the inner row composed of smaller teeth directed downward and backward, the outer series of stronger conical teeth, a few scattering teeth between the 2 rows; teeth in the lower jaw in a narrow, irregular double series. Eye small. Both vertical and horizontal limbs of preopercle minutely serrulate, entire in the adult; opercle ending in a flattened process showing 2 short spinous points, emarginate behind in the adult, without evident spinous points; gill rakers about diameter of pupil, strong, toothed, 1 or 2 above angle, 9 or 10 below. Scales very strongly ctenoid, becoming greatly reduced on nape, about 25 to 40 transverse series between occiput and front of dorsal; a narrow, definite, scaly sheath at base of dorsal and anal, these fins otherwise naked; caudal scaled for a short distance on basal portion; scales above lateral line rapidly increasing in size backwards, 13 in a transverse series between lateral line and front of dorsal;

dorsal spines low and weak, the rays not high, the longest 3⅓ in head; second anal spine slender but not flexible, its length 1½ in soft rays; caudal double truncate, the median rays much produced, equaling length of head behind snout in the adult as usual, shorter, gently rounded; ventrals 1⅘ in head; pectorals in the young short, scarcely reaching tips of ventrals, 1½ in head, in the adult long and falcate, reaching much beyond ventrals. Color, young: Dusky silvery, with coarse black specks along lower part of head and sides; upper half of sides with many irregular blackish spots or blotches, showing little or no tendency to form streaks; dorsals dusky, the basal portion with small black spots; other fins blackish; the caudal lighter at base; mouth white within; lining of gill cavity black, becoming yellow on lining of branchiostegal membranes. In adult, bluish above, dusky silvery on sides and below; no evident black spots or blotches on body or fins; vertical fins blackish, paired fins dusky. Gulf of California; largest of its genus; a huge food-fish, very abundant along the entire eastern shore of the gulf and congregating in great numbers near the mouth of the Colorado River. It enters the river and is found feeding in shallow water near the shore, where it is easily approached and speared. It does not seem to be known at La Paz, and was not seen by us on the western side of the gulf. Many specimens were taken by hand lines at the head of the gulf, the largest weighing 172 pounds. Large specimens were also seen at Guaymas and at the mouth of the Rio del Fuerte. At Guaymas it is said to be a winter visitant, unknown during the summer months. (Gilbert.) (Named for Hon. Marshall McDonald, then U. S. Commissioner of Fish and Fisheries.)

Cynoscion macdonaldi, GILBERT, Proc. U. S. Nat. Mus. 1890, 64, head of Gulf of California. (Coll. Gilbert.)

1788. **CYNOSCION STOLZMANNI** (Steindachner).

Head 3⅔; depth 4⅘. D. IX–I, 21; A. II, 9; scales 10–73–10, –60 pores. Pectoral fins short, reaching little past middle of ventrals, their length not more than ½ head; body elongate, somewhat compressed; mouth oblique; maxillary 2⅙ in head, extending to posterior margin of pupil; snout rather sharp, 4 in head; canines rather small; gill rakers shortish, 4 + 7; body comparatively slender and elongate; scales rather large, all strongly ctenoid; dorsal and anal scaleless; lateral line becoming straight just before front of second dorsal; longest dorsal spines 2⅙ in head; soft dorsal slightly falcate, the first rays about 2 in head; caudal large and broad, double truncate; ventrals 1⅔ in head. Color steel bluish above, lower parts silvery; no distinct markings. Pacific coast of tropical America; Panama to Peru, not rare about Panama. (Named for its discoverer, Stolzmann.)

Otolithus stolzmanni, STEINDACHNER, Neue u. Seltene Fische k. k. Zool. Mus. Wien 1879, 35, pl. 2, fig. 1, Tumbez, Peru.

Cynoscion stolzmanni, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 320.

Cestreus stolzmanni, JORDAN & EIGENMANN, *l. c.*, 370, 1889.

Subgenus ATRACTOSCION, Gill.

1789. CYNOSCION NOBILIS (Ayres).

("WHITE SEA BASS" OF CALIFORNIA.)

Head 3⅗; depth 4. D. X–I, 21 to 23; A. II, 9; scales 12–88–14, pores 70 to 80. Head pointed, subconical, little compressed; profile rather steep; snout sharp, rather long, 3⅗ in head; maxillary extending beyond pupil, anteriorly on a level with the lower margin of the pupil, 2⅓ in head; canines small, becoming obsolete with age; lateral teeth of lower jaw not much enlarged; pharyngeals long and slender, with 4 series of teeth, the inner series several times larger than the rest; gill rakers short, 2 + 7; scales very small, those on head little embedded and less silvery than in related species; maxillary with a few embedded scales; scales on snout running to its tip; caudal lunate, its middle rays less than ½ length of head; both anal spines evident, the second about ½ length of the rays; pectoral fins rather long, more than ½ head; soft dorsal and anal scaleless. Color bluish, little silvery; everywhere punctulate; young with 3 or 4 distinct dusky cross bars; axil and fins dusky; a dusky blotch at base of pectoral, extending on whole inner face of the fin; scales of side of head not silvery. Coast of California, north to San Francisco, occasionally straying farther; a specimen once taken near Victoria by Mr. Ashdown Green. A most valuable food-fish, reaching a weight of 80 pounds or more, its flesh firm and rich. The banded young (*californiensis*) are quite different in appearance and are taken for a distinct species by fishermen as they have been by Steindachner. (*nobilis*, noble.)

Johinus nobilis, AYRES, Proc. Cal. Ac. Sci. 1860, 78, San Francisco. (Coll. Ayres.)
Otolithus californiensis, STEINDACHNER, Ichth. Beitr., III, 31, 1875, San Diego, California, and Magdalena Bay, Lower California; young with dark bands.
Cynoscion nobilis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 456.
Atractoscion nobilis, JORDAN & GILBERT, Synopsis, 579 and 933, 1883.
Cestreus nobilis, JORDAN & EIGENMANN, *l. c.*, 370, 1889.

1790. CYNOSCION PHOXOCEPHALUS, Jordan & Gilbert.

Head 3⅓; depth 4⅓ to 4⅖; eye 7½ in head. D. IX–I, 21; A. III, 10; scales 17–90–15, pores about 80. Body not very elongate, fusiform, little compressed, the greatest thickness nearly ⅔ the greatest depth; back scarcely elevated nor compressed, the profile from the snout to the front of the dorsal nearly straight; head conical, little compressed, pointed in profile, tapering with much regularity toward the tip of the projecting lower jaw; length of mandible more than ½ that of head; mouth large, very oblique, the premaxillary in front on the level of the upper part of the orbit, the broad maxillary extending to below the posterior margin of the eye, 2 in head. Teeth in narrow, cardiform bands in each jaw, the bands composed of about 2 series in front, growing narrow laterally, and finally forming a single series; teeth subequal, with the exception of about 2 pairs in the front of the upper jaw, the posterior pair being developed as small canines directed inward and backward; canines proportionately larger in the smaller specimens than in the adult, but in all they are smaller than is usual in *Cynoscion*. Eye rather small, a little less than ½ the length of the snout, a little more than ½ the breadth of the evenly convex interorbital space, which is 3⅔ in head. Gill rakers 3 + 6, thickish, and very short, shorter than the pupil; pseudobranchiæ quite small. Scales of lower part of cheeks enlarged, embedded, covered with a silvery skin; scales above eyes, on nape and on border of preopercle much reduced in size; preopercle, as in all species of this genus, entire, with a broad membranaceous border; scales on body small and smooth; lateral line scarcely arched in front, becoming straight opposite front of anal. Dorsal fins entirely separate, the spines of the first dorsal slender; second spine shorter than third or fourth, which are considerably elevated, 1¾ in length of head in young, 2⅕ in the adult; soft dorsal wholly scaleless; second dorsal of moderate height, enveloped in lax, scaleless skin, which is thickened at the base of the fin; longest rays a little more than ⅓ length of head; anal rather long and low, its longest rays about equal to the length of the base, and a little more than ⅓ length of head; anal spines very small and weak, wholly enveloped in the skin and not visible; anal fin nearly coterminous with the dorsal, its rays similarly enveloped in loose skin; caudal fin moderate, thickish and scaly at base, lunate, its lobes equal, the middle rays 1⅔ in length of head; ventrals short, about ½ length of head, reaching about ⅓ the distance to the vent; pectorals short, not reaching tips of ventrals, 2 in head; distance from vent to base of caudal about ⅖ its distance from snout. Color in life, dark above with strong bright reflections of purplish-brown; silvery below, the lower part of the caudal peduncle golden yellow; middle of sides noticeably punctulate with brown dots; inside of mouth deep orange yellow; lining of opercle black; dorsal and caudal fins dusky whitish, with more or less of dark edging; lower rays of caudal yellowish; fins otherwise translucent, unmarked; axil of pectoral light yellowish above; the silvery color of the sides of the head and the bright reflections on its upper surface very conspicuous, more so than in any other species of the genus. Length 2 feet; a neat and well-marked species. Pacific coast of Central America; not rare at Panama. (φοξός, tapering; κεφαλή, head.)

Cynoscion phoxocephalum, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 318, Panama.
(Type, No. 29296, 16½ inches long. Coll. C. H. Gilbert.)
Cestreus phoxocephalus, JORDAN & EIGENMANN, *l. c.*, 371, 1889.

1791. CYNOSCION LEIARCHUS (Cuvier & Valenciennes).

Head 3½; depth 4⅓. D. IX–I, 21 to 23; A. II, 10; scales 13–90–13, about 80 distinct pores. Soft dorsal fin with its lower portion covered with small caducous scales. Body compressed; head conic, more compressed than in *C. phoxocephalus;* eye moderate, 5 to 6 in head; maxillary reaching nearly to posterior margin of orbit, 2¼ in head; lower jaw much projecting; upper teeth mostly biserial; canines small, both of them present; lateral teeth of lower jaw small; gill rakers short and slender, 2+7; scales small, chiefly cycloid, those on sides of head bright silvery; lateral line becoming straight above front of anal; soft dorsal and anal scaleless;

caudal fin subtruncate; pectoral fins moderate, 2 in head; caudal weakly double truncate. Coast of Brazil and Guiana, probably not rare. Here described from specimens from Rio Janeiro, Porto Alegre, Bahia, and Santos. (λεῖος, smooth;* ἀρχός, anus.)

Otolithus leiarchus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 78, 1830, Brazil; Cayenne; GÜNTHER, Cat., II, 308, 1860; JORDAN, Proc. U. S. Nat. Mus. 1886, 540; note on type of CUVIER & VALENCIENNES.
Cestreus leiarchus, JORDAN & EIGENMANN, *l. c.*, 371, 1889.

1792. CYNOSCION VIRESCENS (Cuvier & Valenciennes).

Head 3½; depth 5 to 5½. D. X–I, 28; A. II, 8; scales 80 (pores), 125 to 130 cross series. Body long and low, spindle-shaped, the head slender, subtruncate, depressed above, formed much as in *Rachycentron canadum;* profile from snout to dorsal weakly concave; snout long, rather pointed, 4 in head; mouth large, little oblique, the lower jaw strongly projecting, the maxillary 2⅗ in head; canine teeth 2, short and thick; lateral teeth moderate, close-set; eye small, 8½ in head; interorbital space flattish, 4¾ in head; gill rakers short and thickish, 8 below angle of arch, the longest ½ eye; scales on head very small and silvery; soft dorsal wholly naked, a few scales on anal; caudal S-shaped, the middle rays longest; pectoral rather long, 1⅕ in head. Color plain greenish, silvery below; gill cavity dusky within. Coasts of Guiana and Brazil, rather scarce. Here described from a specimen 18 inches long from Victoria, Brazil. (*virescens*, growing green.)

Otolithus virescens, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 72, 1830, Surinam.
Otolithus microps, STEINDACHNER, Neue Fisch-Arten k. k. Museen Wien, Stuttgart und Warschau, 38, pl. 8, fig. 2, 1879, Porto Alegre, Brazil.

1793. CYNOSCION MICROLEPIDOTUS (Cuvier & Valenciennes).

Head 3⅖; depth 4¼; snout 4 in head; eye large, 4¾; interorbital space 5½ in head. D. XI–I, 23; A, II, 9; scales 70 (pores), 155 to 160 in a longitudinal series. Body moderately elongate, covered with very small scales; soft dorsal and anal closely scaly throughout; maxillary extending beyond eye; lower jaw projecting; teeth moderate; canines rather strong; lateral teeth of lower jaw not canine-like; gill rakers not described, probably as in *virescens*. Dorsal spine slender, the longest 2⅐ in head; pectoral slightly longer than ventral, which is slightly more than ½ head; caudal fin S-shaped; lateral line becoming straight above anal. Coloration plain greenish, silvery below. Coast of Brazil and Guiana, not common. (Steindachner.) (μικρός, small; λεπιδωτός, scaled.)

Otolithus microlepidotus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 79, 1830, Surinam; GÜNTHER, Cat., II, 311; STEINDACHNER, Neue und Seltene Fische k. k. Zool. Mus. Wien, 39, 1879.
Cestreus microlepidotus, JORDAN & EIGENMANN, *l. c.*, 371.

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*In the dried skin of the type, a young example in the museum at Paris, the absence of the anal spine ("leiarchus") is due to its being covered by varnish.

573. SAGENICHTHYS, Berg.

Ancylodon (CUVIER) Oken, Isis, 1182, 1817 (*jaculidens* = *ancylodon*); not *Ancylodon* Illiger, 1811, a genus of mammals.
Sagenichthys, BERG, Ann. Mus. Nac. Buenos Aires 1895, 52 (*ancylodon*).

This genus is close to *Cynoscion*, differing mainly in the form of its canines, which are lance-shaped, widened toward the tip, then abruptly narrowed; lateral teeth larger than in *Cynoscion*. South American; 2 species known. (*σαγήνη*, seine or net; *ἰχθύς*, fish, from the Spanish name Pescadillo del Red, the most valuable fish netted in Uruguay.)

1794. SAGENICHTHYS ANCYLODON (Bloch & Schneider).

(PESCADILLO DEL RED.)

Head 3¼; depth 4; eye 6½ in head. D. IX–I, 27 or 28; A. II, 10; scales 75 (pores), 85 rows. Body oblong, moderately compressed, the general form of species of *Cynoscion*; mouth oblique, the lower jaw projecting; maxillary moderate, 2⅓ in head; snout rather pointed, 4½ in head; preorbital narrow; large canine of upper jaw very long, lance-shaped, *i. e.*, widened toward the tip and then abruptly pointed; about 2 canines in front of lower jaw on each side, also lance-shaped, but much smaller; outer teeth of upper jaw enlarged and showing something of the same form; enlarged lateral teeth of lower jaw compressed; gill rakers moderate, slender, 3+8, the longest ⅔ eye; caudal fin rhombic; spinous dorsal very weak; soft dorsal and anal scaly; pectoral 1⅖ in head; lateral line becoming straight before vent. Color bluish above, silvery below, sometimes with dark streaks along the rows of scales; caudal lobe darker, sometimes black. Length 15 inches. Sandy coast of tropical America, both Pacific and Atlantic; common from Guiana southward to Uruguay and Argentine; also common about Panama; a most excellent food-fish. Here described from a specimen from Rio Grande do Sul. Specimens from Panama agree in every respect. If any difference exists it must be sought in companion of specimens in good condition. (*ἀγκύλος*, hooked; *ὀδούς* tooth.)

Lonchurus ancylodon. BLOCH & SCHNEIDER, Syst. Ichth., 102, pl. 25, 1801; Surinam.
Ancylodon jaculidens, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 81, 1830, Cayenne; GÜNTHER, Cat. Fish., II, 311, 1860; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 111.
Ancylodon ancylodon. JORDAN & EIGENMANN, *l. c.*, 373, 1889.
Sagenichthys ancylodon, BERG, Ann. Mus. Buen. Aires 1895, 52.

574. NEBRIS, Cuvier & Valenciennes.

Nebris, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 149, 1830 (*microps*).

Body rather elongate, tapering backward; skull excessively cavernous, soft and spongy to the touch, the interorbital space very broad; mouth large, the lower jaw projecting; teeth subequal, in narrow bands; eye very small; preopercle with a broad membranaceous border, which is striated and fringed; preorbital narrow and flat; slits and pores of upper jaw little conspicuous; vertebræ 10 + 14; gill rakers long and slender, scales small; pseudobranchiæ present. Air bladder with 2 horns. Soft dorsal and anal long and scaly; spines of fins weak. Lower pharyngeals narrow, separate. Two species; singular-looking fishes allied to *Cynoscion*, but weakly armed. (*Nebris*, an old name of some fish.)

a. Scales above lateral line 80, pores 50.	MICROPS, 1795.
aa. Scales above lateral line 110, pores 55.	ZESTUS, 1796.

1795. **NEBRIS MICROPS**, Cuvier & Valenciennes.

Head 3; depth 4⅓; eye minute, 9½ in head, 2½ in snout, 4 in interorbital area, 1½ in width of maxillary, which is very broad. D. VIII-I, 31; A. II, 13; scales 18–85–18, 50 pores.

Body plump, anteriorly tapering to the slender caudal peduncle; profile straight, head broad, heavy, extremely spongy above; mouth very large, oblique; lower jaw projecting, premaxillary anteriorly on a level with the middle of the eye; maxillary extending to below posterior margin of orbit, 2⅓ in head; teeth all minute, those of the lower jaw in a single series, those in the upper jaw in a band which widens backward; tongue large and thick; head entirely scaly; margin of the preopercle indistinct, with a very wide membranaceous edge, which is nearly covered with scales; gill rakers long and slender, 5 + 15; scales small, cycloid; lateral line little arched; the bases, at least of all the soft fins, densely covered with small scales; dorsal spines feeble, shorter than the dorsal rays; caudal lanceolate; pectorals 1⅓ in head; ventrals 1⅔. Color silvery, darker above; pectorals dusky on their inner margin. Atlantic coast of northern South America, Guiana and Brazil, on sandy shores. (*μικρός*, small; *ὤψ*, eye.)

Nebris microps, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 149, pl. 112, 1830, Surinam; GÜNTHER, Cat., II, 316, 1860; STEINDACHNER, Ichth. Beitr., IV, 10, 1875; JORDAN & GILBERT, Bull. U. S. Fish. Comm. 1882, 111; JORDAN & EIGENMANN, *l. c.*, 374.

1796. **NEBRIS ZESTUS**, Jordan & Starks, new species.

Head 3⅓; depth 4¾. D. VI to VIII, 28 to 31; A. II, 12; eye 10 in head; snout 4; maxillary 2⅓; highest dorsal spine 3; pectoral at least 1½; ventral 2; scales 20–110–20; lateral line with about 55 pores. Body scarcely compressed, the dorsal and ventral outlines about equal and uniform. Head large; anterior profile more or less decurved over snout, thence gently curved to dorsal; snout blunt, the nostrils close together and close to eye; mouth large, very oblique, the jaws about equal; maxillary very broad, truncate behind, reaching to posterior margin of eye; teeth villiform in several series in upper jaw, in 1 in lower, all pointed and curved inward; tongue large and thick; gill rakers slender, the longest a little longer than eye, 6 + 12 in number; a short slit behind last gill arch; pseudobranchiæ very small. Head entirely scaled; scales on head larger than on body; margin of preopercle indistinct, with a wide membranaceous edge; scales along lateral line running to end of caudal rays, nearly twice as large as those on the rest of body. Spines of dorsal very feeble and covered with small scales, the third spine highest, slightly higher than soft rays; anal and dorsal closely scaled; anal spines scarcely distinguishable. Pectorals long, $1\frac{1}{4}$ in head, reaching much beyond ventrals; ventrals inserted below base of pectorals, $1\frac{3}{5}$ in head; caudal double truncate, the middle rays $1\frac{1}{3}$ in head. Coloration pale. Length 1 foot or a little more. Sandy shores about Panama, rather common. Here described from numerous specimens brought by Dr. Gilbert from Panama. Very close to *Nebris microps*, the scales apparently smaller. (ζεοτός, soft-boiled, referring to the soft, very spongy head.) (Types, No. 433, and others, L. S. Jr. Univ. Mus. Coll. Gilbert.)

575. PLAGIOSCION, Gill.

Plagioscion, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 82 (a generic description only; no species or type being indicated.)

Diplolepis, STEINDACHNER, Beiträge zur Kenntniss der Sciænoiden Brasiliens, 2, 1863, (*squamosissimus*); name preoccupied in Hymenoptera.

Plagioscion, JORDAN & EIGENMANN, Review Sciænidæ, 380, 1889 (*squamosissimus*).

This genus consists of fresh water Sciænoids, inhabiting the rivers of South America, probably occasionally descending to the sea. It is closely allied to *Corvula* and *Pseudotolithus*, from both of which it is well distinguished by the peculiar squamation of the lateral line, a character which suggested to Dr. Steindachner the name *Diplolepis*, the scales of the lateral line being covered with smaller ones. Like most fresh-water fishes, the species of *Plagioscion* are subject to many variations, especially in regard to the size of the second anal spine. But 3 or 4 of the many nominal species seem to be valid. We attach to this genus, with doubt, a species (*heterolepis*) which we have not seen and which may belong to *Ophioscion*. (πλαγιός, oblique; σκίον, *Sciæna*.)

a. Second anal spine small, scarcely longer than eye, 4 to $5\frac{1}{2}$ times in length of head,
  b. Dorsal rays X–I, 31 or 32. SQUAMOSISSIMUS, 1797.
  bb. Dorsal rays X–I, 28 or 29. HETEROLEPIS, 1798.
aa. Second anal spine very large and strong, 2 to 3 in head; dorsal rays X–I, 32 or 33. SURINAMENSIS, 1799.

1797. PLAGIOSCION SQUAMOSISSIMUS (Heckel).

Head $3\frac{1}{8}$; depth $3\frac{1}{5}$. D. X–I, 31 or 32; A. II, 7; scales (large ones or pores) 49 to 53. Second anal spine small, scarcely longer than eye, its length 4 to $5\frac{1}{2}$ in head; teeth of lower jaw with the inner series considerably enlarged; snout of moderate length, 5 in head; eye $5\frac{1}{2}$; maxillary $2\frac{1}{5}$ in head; gill rakers rather long, $x+12$; pseudobranchiæ usually small on one side and obsolete on the other; upper part of the preopercle crenulate on its bony margin; pectoral fin short, $1\frac{3}{5}$ in head; anal spine $4\frac{1}{2}$ to $5\frac{1}{2}$, its length subject to much variation; caudal convex; ventrals filamentous at tip. Lower pharyngeals narrow, armed with villiform teeth. Color silvery, darker above, the axil with a large black spot. Rivers of Guiana and Brazil, generally common southward; no Guiana specimens seen by us, the specimens here described from Obidos and Coary.

Sciæna squamosissima, HECKEL, Annalen des Wiener Museum, II, 438, 1840, Amazon; STEINDACHNER, Beitr. zur Kenntniss der Fisch-Fauna Sud-Americas, 3, 1879.

? *Sciæna rubella*, SCHOMBURGK, Naturalists' Library, Fishes of Guiana, II, 133, 1843, Rivers of Guiana. (D. IX, 34; A. II, 6; anal spines presumably small.)

Johnius crouvina, CASTELNAU, Anim. Nouv. ou Rares de l'Amér. du Sud, Poissons, 11, pl. V, fig. 1, about 1855, Rio Crixas, Rio Araguay.

Johnius amazonicus, CASTELNAU, Anim. Nouv. ou Rares de l'Amér. du Sud, Poiss., 12, pl. 4, fig. 1, 1855, Amazon.

Corvina monacantha, COPE,[*] Trans. Am. Phil. Soc. 1866, 402, near Paramaribo, Dutch Guiana.

Sciæna amazonica, GÜNTHER, Cat., II, 284, 1860.

Sciæna crouvina, GÜNTHER, Cat., II, 287, 1860.

Pachyurus squamosissimus, GÜNTHER, Cat., II, 526, 1860.

Diplolepis squamosissimus, STEINDACHNER, Sciæn. Brasil., 2, 1863.

Plagioscion squamosissimus, JORDAN & EIGENMANN, *l. c.*, 383.

1798. PLAGIOSCION HETEROLEPIS[†] (Bleeker).

Head $3\frac{1}{3}$ to $3\frac{1}{2}$; depth $3\frac{1}{2}$ to $3\frac{3}{5}$. D. X–I, 28 or 29; A. II, 7; scales 45. Caudal rhombic, its length $\frac{2}{3}$ that of head; body rather elongated, the form much as in *Ophioscion typicus* but the head less depressed; profile depressed above eye; eye 4 in head, as long as the snout, which is rather long, bluntish at tip; preorbital $\frac{2}{3}$ length of eye; mouth moderate, horizontal; maxillary extending to below middle of eye, $2\frac{1}{2}$ in head; teeth in many series, outer series of the upper jaw somewhat longer, those of the lower jaw all subequal; preopercle entire (in the figure); scales of the cheek cycloid, those of the opercle and body ctenoid; 46 series of scales above the lateral line, 40 below it; spinous dorsal little longer than high, the spines slender, scarcely flexible, the third longest, 2 in head; soft dorsal densely scaly, the longest ray $2\frac{3}{4}$ in head; second anal spine small, little longer than the eye, $3\frac{1}{2}$ in head; pectorals $1\frac{2}{5}$ in head. Color greenish or bluish-gray above, silvery below; fins yellowish. Surinam; not seen by us, perhaps not belonging to this genus. (*ἑτερός*, different; *λεπίς*, scale.)

Johnius heterolepis, BLEEKER, Archives Neerlandaises, VIII, 1873, 458, with plate, Surinam.

Sciæna heterolepis, JORDAN & EIGENMANN, *l. c.*, 405.

1799. PLAGIOSCION SURINAMENSIS (Bleeker).

Head $3\frac{2}{5}$; depth $3\frac{2}{5}$. D. X–I, 31 to 33; A. II, 6; enlarged scales in lateral line about 50, about 100 in a longitudinal series above it. Second anal spine large and strong, its length 2 to 3 in head; teeth of lower jaw with the inner series considerably enlarged; snout very short, blunt, $5\frac{1}{2}$ in head; head depressed above the eyes; mouth large, rather oblique, subinferior, the maxillary $2\frac{1}{2}$ in head, reaching past eye; back elevated; ventral outline nearly straight; caudal peduncle slender; preorbital broad, a little narrower than eye, which is $5\frac{1}{2}$ in head; preopercle rounded, nearly or quite entire; teeth of outer series in upper jaw and inner series of lower notably enlarged; dorsal spines slender, the highest 2⅖ in head; pectoral 1⅖ in head; ventrals 1¾; scales all ctenoid. Color grayish above, silvery below; upper vertical fins punctate; lower fins yellowish; axil dark. (Steindachner.) Rivers of Guiana, Venezuela, and Colombia; not seen by us.

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[*] The following is the substance of Professor Cope's description of *Corvina monacantha:* First ventral ray produced as a filament which reaches past the vent; pseudobranchiæ none; eyes 5 in head; depth equal to length of head; preopercle sharp, serrate on its vertical margin; pharyngeal patches of teeth small, the teeth bristly; caudal fin sublanceolate; pectorals as long as ventrals without filaments; anal spines short, single in typical specimens; color, silvery, grayish above; no spots. D. X–I, 33; A. I, 5. Scales 10–49–16.

[†] Bleeker's figure represents the species as having the preopercle entire as in *Johnius* and *Plagioscion*. In other regards it resembles *Ophioscion*.

Pseudosciæna surinamensis, BLEEKER, Arch. Neerl. Sci. Exact. et Nat., VIII, 1873, 458, Surinam.

Sciæna magdalenæ, STEINDACHNER, Zur Fisch-Fauna des Magdalenen-Stromes, 6, 1878, Magdalena Bay, Venezuela.

Sciæna surinamensis, STEINDACHNER, Fisch-Fauna des Cauca, 4, 1880.

576. LARIMUS, Cuvier & Valenciennes.

Larimus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 145, 1830 (*breviceps*).

Amblyscion, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 165 (*argenteus*).

Monosira, POEY, Anales de Hist. Nat. Esp. 1881, 326 (*stahli*).

Body rather elongate, compressed; skull firm, not greatly cavernous; interorbital space rather narrow; preorbital flattish, not turgid; upper jaw with the usual slits and pores little developed; no barbels; no canines; snout very short, mouth large, terminal, very oblique or even vertical, the lower jaw projecting; teeth minute, equal, uniserial or partly biserial above; preopercle entire or nearly so, without bony teeth. Scales moderate, subequal. Pseudobranchiæ well developed. Fins essentially as in *Bairdiella*, the second dorsal long, the anal short, its spines moderate or small; fins not thickened by accessory scales. Gill rakers long and slender. Vertebræ 10 + 14. Silvery fishes, all American. (*Larimus*, a name used by Oppien for some fish, "sans signification précise.")

(AMBLYSCION ἀμβλύς, blunt; σκίον, *Sciæna*.):

a. Mouth large, the cleft quite vertical; profile slightly convex, nearly horizontal; no traces of dark stripes along the rows of scales; maxillary not extending beyond anterior margin of pupil, 2 in head; snout very short, 5½ in head; ventrals a little shorter than pectorals which are as long as head. D. X-I, 27; A. II, 6. ARGENTEUS, 1800.

LARIMUS:

aa. Mouth more or less oblique, not quite vertical; upper parts with dark streaks along the rows of scales; profile slightly convex, a little oblique; maxillary extending to below front of orbit, 2 in head.
  - *b*. Dorsal rays 27 to 30; mouth notably oblique.
    - *c*. Upper parts silvery, without dark streaks or cross bands; pectorals long and narrow, ⅒ longer than head. D. X-I, 28 to 30. EFFULGENS, 1801.
    - *cc*. Upper parts with distinct dark streaks along the rows of scales.
      - *d*. Second anal spine 1¾ to 2¼ in head, not reaching tips of soft rays; dark streaks very distinct; mouth less oblique; gill cavity largely black. ACCLIVIS, 1802.
      - *dd*. Second anal spine 1⅔ in head, reaching tips of soft rays; dark streaks on sides not very distinct; mouth very oblique; gill cavity pale. BREVICEPS, 1803.
  - *bb*. Dorsal rays 24 to 27; mouth still less oblique, the snout more convex, the profile descending forward.
    - *e*. Color silvery, with more or less distinct streaks along the rows of scales; no dark cross bars.
      - *f*. Second anal spine rather short, 3 in head; stripes very distinct; pectorals 1¼ in head, reaching vent. D. X-I, 27; A. II, 6. PACIFICUS, 1804.

ee. Color grayish, silvery, with about 7 dark vertical cross bars; second anal spine short, $3\frac{1}{4}$ in head. Body heavy forward, much compressed, the snout very short and blunt, $5\frac{1}{2}$ in head; mouth large, less oblique than in other species; tip of premaxillary on level of middle of pupil; maxillary 2 in head; gill rakers extremely elongate, as long as eye, 12 + 24; second anal spine short, $\frac{1}{4}$ shorter than the first soft ray. D. X–I, 24 to 26; A. II, 5 or 6. FASCIATUS, 1805.

Subgenus AMBLYSCION, Gill.

1800. LARIMUS ARGENTEUS (Gill).

Head $3\frac{1}{6}$; depth 3; snout very short, $5\frac{1}{2}$ in head; eye large, $4\frac{2}{3}$. D. X–I, 27; A. II, 6; scales 6–49–10. Body robust, strongly compressed. Mouth large, the cleft vertical; anterior profile slightly convex, nearly horizontal; maxillary not extending beyond anterior margin of pupil, its end wide and truncate, 2 in head; teeth all minute, in a single row in each jaw; preopercle with a striated and cilliated membranaceous border; gill rakers $\frac{2}{3}$ length of eye, 7+16; scales on head all cycloid; lateral line running out to end of caudal rays; highest dorsal spine $2\frac{1}{3}$ in head; second anal spine strong, nearly as long as rays, its tip reaching to tip of last ray, its length $2\frac{1}{2}$; ventrals a little shorter than pectorals, which are about as long as head. Color plumbeous above, golden below and on sides; a black axillary spot; a large steel-blue opercular spot; no traces of dark stripes along the rows of scales. Of all known species of *Sciænidæ*, this one has the mouth most nearly vertical. There is, however, in its structure nothing to warrant its separation as a distinct genus, *Amblyscion*. Mazatlan to Panama; locally common; a most singular fish. (*argenteus*, silvery.)

Amblyscion argenteus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 165, West coast of Central America. (Coll. Capt. J. M. Dow.)

Larimus argenteus, JORDAN & GILBERT, Bull. U. S. Fish. Comm. 1882, 110; JORDAN & EIGENMANN, *l. c.*, 375.

Subgenus LARIMUS.

1801. LARIMUS EFFULGENS, Gilbert.

Head $3\frac{1}{4}$ to $3\frac{1}{10}$; depth $2\frac{4}{5}$ to 3. D. XI, 28 to 30; A. II, 6; P. 16. Eye large, $3\frac{4}{5}$ to $4\frac{1}{5}$ in head; interorbital space $4\frac{1}{3}$ to $4\frac{1}{2}$; pores of lateral line 49 or 50. Mouth slightly more oblique than in *L. acclivis*, much less so than in *L. argenteus*. Premaxillaries anteriorly on a level with middle of pupil (lower part of pupil in *L. acclivis*). Maxillary reaching about vertical from front of pupil, $2\frac{1}{5}$ to $2\frac{1}{7}$ in head. Teeth minute, close-set, even, in a single series in each jaw, none of them enlarged. Preopercular margin membranous, with flexible ribs ending in minute spinules. Gill rakers very long, $\frac{2}{3}$ diameter of orbit, 19 or 20 on horizontal limb of arch. Dorsal spines high and flexible, the first 2 not noticeably thickened; tenth spine shortest; soft dorsal very long, its base $2\frac{1}{3}$ to $2\frac{1}{2}$ in length; third dorsal spine longest, 2 to $2\frac{1}{3}$ in head; the longest dorsal ray equals length of snout and eye; second anal spine very strong, $2\frac{1}{5}$ in head; pectoral very long and narrow, $\frac{1}{10}$ longer than head, injured in most specimens; ventrals reaching to or slightly beyond vent, $1\frac{1}{3}$ in head; caudal lanceolate, the middle rays much produced, as long as head; tubes of lateral line much branched; definite scaly sheaths along bases of dorsal and anal; basal portions of membranes of vertical fins with series of scales. Bright silvery, the back grayish; lining of cheeks black, a small black blotch on upper third of axil; ventrals, anal, and lower caudal rays bright orange yellow; fins otherwise dusky translucent. Length 8 inches. Panama, rather common; numerous specimens were secured. (Gilbert.) Very close to *L. acclivis*, with which it agrees in almost all details of structure. The color is, however, bright silvery without trace of stripes, as in *L. argenteus*. The pectoral fin is also much longer. (*effulgens*, shining.)

Larimus effulgens, GILBERT MS., Fishes of Panama 1898, Panama. (Coll. Gilbert.)

1802. LARIMUS ACCLIVIS, Jordan & Bristol.

Head $3\frac{1}{4}$ to $3\frac{1}{3}$; depth $2\frac{9}{10}$ to $3\frac{1}{6}$. D. X–I, 27 to 29; A. II, 5 or 6; scales 6 or 7 (counting from third dorsal spine obliquely backward)—47 to 49–10 or 11. Body robust, compressed; the back somewhat elevated; profile convex. Head narrow, its width $2\frac{1}{6}$ to $2\frac{2}{5}$ in its length. Snout short, $5\frac{1}{4}$ to $5\frac{2}{5}$ in head. Eye large, $3\frac{1}{10}$ to $3\frac{1}{3}$ in head. Mouth large, the cleft oblique, less steep than in *L. breviceps;* lower jaw curved, considerably projecting; maxillary extending about to middle of pupil, $2\frac{1}{8}$ to $2\frac{1}{7}$ in head. Teeth minute, firm, uniserial in each jaw. Interorbital region convex, $1\frac{1}{4}$ to $1\frac{1}{3}$ in eye. Gill rakers 11 or 12 + 20 or 21, long and slender. Preopercle with a finely serrated membranaceous margin. Least depth of caudal peduncle $2\frac{7}{8}$ to 3 in head. Scales rather large, mostly ctenoid, cycloid on head excepting those on posterior portion of the top, the rows above lateral line abruptly oblique, a character subject to great variation; the scales in the lateral line with about 5 or 6 tubules; anal and dorsal with a sheath at base, the scales of which are cycloid; the sheath beneath the spinous dorsal not very distinct; the fins excepting spinous dorsal, scaled for a short distance above base with cycloid scales, those on caudal extending halfway to its tip. Origin of spinous dorsal $2\frac{1}{6}$ to $2\frac{2}{5}$ in origin of soft dorsal; third dorsal spine $1\frac{2}{3}$ to $1\frac{7}{8}$ in head; soft dorsal about $1\frac{1}{2}$ times as long as head; origin of anal $3\frac{1}{2}$ to $3\frac{7}{8}$ in head; second spine moderate, $1\frac{3}{4}$ to $2\frac{1}{4}$ in head, not reaching tips of soft rays; ventrals reaching slightly past vent, $1\frac{1}{6}$ in head; pectorals reaching slightly past tip of ventrals equaling, or $1\frac{1}{8}$ in, head. Color grayish silvery, darker above, clear silvery white below; conspicuous dark brown or black stripes on back and sides following the rows of scales, formed of more or less coalescent dark spots; lower part of head bright silvery; a large steel-blue axillary spot; region about pseudobranchiæ largely black; region in lower part of mouth bright orange, and traces of orange in upper part; lower mandible blackish; tongue dusky at tip; a somewhat indistinct narrow streak of plain dark brown extending from a point in the median line, $\frac{3}{7}$ the distance from the first dorsal spine to tip of premaxillary, obliquely backward and downward to or nearly to the lateral line, this streak more clearly seen in dry specimens; fins dusky; spinous dorsal dark brown; ventrals yellowish, dusky at tip; both ventrals and pectorals darker on their inner than on their outer surfaces. This species differs from *L. breviceps* chiefly in the shorter anal spine, the much more distinct dark lines, the less nearly vertical mouth, the back more steeply arched, the darker color of the gill cavity. In some cases the direction of the rows of scales on the back is more nearly vertical, but in this there are great variations. West coast of Mexico and Central America, from Sonora to Panama; not rare on sandy shores. Length 4¾ to 6¾ inches. Described from numerous specimens from San Juan Lagoon, Sonora, and from Panama. (*acclivis*, steeply ascending, referring to the direction of the rows of scales above lateral line.)

Larimus acclivis, JORDAN & BRISTOL, Proc. U. S. Nat. Mus. 1897, San Juan Lagoon, Sonora. (Coll. *Albatross*. Type, No. 45, L. S. Jr. Univ. Mus.)

1803. LARIMUS BREVICEPS, Cuvier & Valenciennes.

(CABEZON.)

Head 3⅖; depth 3; eye 4 in head. D. X–I, 28; A. II, 6; scales 7 (counting from third dorsal spine obliquely backward) 48–9. Body robust; the profile less convex than in *L. acclivis*. Width of head 2 in its length; snout short, 5 in head. Cleft of mouth approaching a perpendicular much more nearly than in *L. acclivis;* the lower jaw less convex; maxillary 2 in head. Teeth minute, firm, uniserial in each jaw. Interorbital region convex, 4 in head and 1 in eye. Gill rakers about 10 + 20, long and slender, the longest 1¼ in head; least depth of caudal peduncle 3 in head. Scales as in *L. acclivis*, excepting that in our specimens the rows above the lateral line are rather more horizontal and therefore fewer in number than in some specimens of *L. acclivis*. Origin of spinous dorsal 2 in origin of soft dorsal and 1¾ in head; third dorsal spine 1⅔ in head; second anal spine 1⅔ in head, reaching to tip of longest soft ray; ventrals 1¼ in head; pectoral as long as head. Color silvery, brown above, clear white silvery below; the rows of scales above with dark streaks, these much less distinct than in *L. acclivis;* a brownish axillary spot; region about pseudobranchiæ but little dusky; lower part of mouth, and sides of mouth on upper jaw orange; tip of tongue and end of lower mandible dusky; fins dusky; spinous dorsal darker; ventrals yellowish; upper part of pectoral dusky. Length 10 inches. West Indies, south to Brazil. Here described from a specimen collected by the *Albatross* from St. Lucia and from a specimen in the U. S. National Museum from Kingston, Jamaica. (*brevis*, short; *-ceps*, head.)

Larimus breviceps, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 146, pl. 140, 1830, Brazil; San Domingo; GÜNTHER, Cat., II, 268, 1860; GÜNTHER, Fishes Central America, 387 and 425, 1869; BEAN & DRESSEL, Proc. U. S. Nat. Mus. 1884, 158; JORDAN & EIGENMANN, *l. c.*, 375, 1889, in part, Atlantic specimens.

? *Monosira stahli*,* POEY, Fauna Puerto Riqueña, 326, pl. 6, 1881, Puerto Rico.

Larimus stahli, JORDAN & EIGENMANN, *l. c.*, 376, 1889.

**Monosira stahli*, POEY, seems identical with *L. breviceps*. The following is the substance of Poey's description:

Head 3⅓; depth 3; eye 3½; snout 5. D. X–I, 25; A. II, 5. Body deep, snout short, the profile descending forward; mouth large, maxillary 2 in head, lower mandible produced and curved, a pore on each side of the symphysis; gill rakers long and slender: teeth uniserial, numerous and very small, those of the lower jaw slightly larger; pectorals lanceolate, reaching beyond vent, slightly longer than head; second anal spine long, nearly 2 in head. Color white, with faint streaks, but without vertical dark bars. Porto Rico. (Named for Dr. Agustin Stahl, of Puerto Rico, of whose collection of fishes this species formed a part.)

1804. LARIMUS PACIFICUS, Jordan & Bollman.

Head 3 (3¾); depth same. D. X–I, 27; A. II, 6; scales 6–50–11. Body compressed, formed as in other species; back elevated, regularly rounded from snout to last dorsal ray; ventral outline most arched anteriorly, base of anal oblique. Distance from ventrals to anal more than depth of body, so that the ventrals do not reach vent. Profile of head depressed very slightly before dorsal and above eyes. Snout short, 4¾ in head. Eye moderate, equal to width of interorbital, 4 in head. Mouth rather large; maxillary reaching posterior border of eye, 2⅕ in head. Premaxillary opposite middle of pupil. Width of preorbital ⅓ eye. Pores of snout and chin as in other species of *Larimus*. Preopercle with a narrow, crenulate, membranous border; scapular scale with well-developed membranous teeth; opercle with 3 graduated, stiff, membranous spines above and another below. Gill rakers, long and slender, longest equal to length of eye, about 10 + 20. Scales on head and anterior part of breast cycloid; bases of membranes of fins scaly. First dorsal spine inserted over base of pectorals; fourth spine longest, 2½ in head. Anterior and posterior soft rays of dorsal subequal, 3 in head. Second anal spine short, not much over ½ as long as first rays, its tip not nearly reaching end of last ray, 3 in head; second anal ray 2½ in head; distance between origin of ventrals and anal ⅕ more than depth of body; pectorals 1¼ in head, reaching anus; ventrals not reaching vent by almost ½ eye, 1⅖ in head. Coloration essentially similar to that of *L. acclivis*; silvery, with confluent dusky spots forming dark streaks along the rows of scales; numerous black dots from snout to caudal below lateral line; opercle appearing dusky externally, because the skin lining the region around pseudobranchiæ is inky black; dorsal, caudal, anal, and pectorals somewhat dusky; soft dorsal pale at base, then with a dusky and pale longitudinal streak, the distal half dusky; general coloration less yellow than in *breviceps* and the streaks along scales more prominent. Here described from the type, a specimen 5½ inches long. Off coast of Colombia.

Larimus pacificus, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 161, Pacific Ocean, off coast of Colombia, at Albatross station 2802, 8° 38′ N., 79° 31′ 30″ W., between Galapagos Island and Panama. (Type, No. 41168. Coll. *Albatross*.)

1805. LARIMUS FASCIATUS, Holbrook.

Head 3½; depth 3; eye 4 in head. D. X–I, 24 to 26; A. II, 5 or 6; scales 5–49–9 to 11. Body heavy forward, much compressed, the back somewhat elevated; profile convex; snout very short and blunt, 5½ in head; eye about equal to flattish interorbital area; mouth large, less oblique than in other species; tip of premaxillary on level of middle of pupil; maxillary 2 in head, reaching to below posterior third of eye; lower mandible with a slight knob at its symphysis, a small pore on each side of it; teeth minute, firm, in a single series in each jaw; pharyngeal teeth all long and slender; the pharyngeal bones small and narrow, subtriangular; gill rakers extremely elongate, as long as eye, 12 + 24; preopercle with minute cilia; third and fourth dorsal spines about 2¼ in head; preopercle with minute cilia; third and fourth dorsal spines about 2¼ in head; second anal spine short, ¼ shorter than the first anal ray, its tip scarcely reaching end of last ray when spine is depressed, 3 in head; scales large, ctenoid; anal and soft dorsal with a scaly sheath at base. Color in life, grayish olive above, with some silvery; below, clear silver white; back with 7 to 9 rather conspicuous darker vertical bars extending to below middle of sides; fins dusky olive; anal fin and lower rays of caudal yellow; ventrals orange yellow, dusky towards tip; lower side of head very bright silvery; inside of mouth and lining of gill cavity, cheeks and opercles with some light yellow. South Atlantic coast of the United States, from Chesapeake Bay to Galveston, Texas; occasionally straying north to Woods Hole, not common, found in rather deep water. (*fasciatus*, banded.)

Larimus fasciatus, HOLBROOK, Ichth. South Carolina, 153, pl. 22, fig. 1, 1860, Charleston; GÜNTHER, Cat., II, 269, 1860; JORDAN & GILBERT, Synopsis, 578, 1883; JORDAN & EIGENMANN, *l. c.*, 376, 1889.

577. ODONTOSCION, Gill.

Odontoscion, GILL, Proc. Ac. Nat. Sci. Phila., 1862, 18 (*dentex*).

This genus differs from *Larimus* mainly in the presence of canines and may be described as a *Larimus* armed with canine teeth. It also approaches closely to *Bairdiella*, from which it differs in lacking the plectroid spine on the preopercle, and in the dentition, the group *Elattarchus* lying between the two, as does also the closely related group *Corvula*. (ὀδούς, tooth; *σκίον*, a modern Greek name, corresponding to *Sciæna*.)

a. Dorsal rays XI-I, 23; canines rather strong; color soiled silvery. DENTEX, 1806.

aa. Dorsal rays XI-I, 26; canines smaller; color dark gray with darker streaks. XANTHOPS, 1807.

1806. ODONTOSCION DENTEX (Cuvier & Valenciennes).

(CORVINA.)

Head 3 to 3⅓; depth 3¼; eye 3¾ to 4 in head; snout 4. D. XI or XII–I, 23; A. II, 8; scales 7–49 to 52–10. Teeth in each jaw in a single series, the 2 front teeth in lower jaw large canines, some of the teeth on the side of the lower jaw also enlarged, canine-like; teeth of the upper jaw largest forward, smaller than those in the lower jaw; body oblong, compressed, the profile straight and rather steep; snout short, blunt; eye large; preopercle rounded without any distinct spines, with crenulated membranaceous margin; highest dorsal spine 2 in head; distance from first anal spine to middle of base of caudal 3⅙ in length; distance from vent to first anal spine 1⅓ in base of anal; second anal spine much shorter than rays, its tip when depressed not reaching to tip of last ray, its length 3 in head; mouth large, oblique, maxillary reaching beyond middle of orbit, 2 in head; preorbital very narrow, about 4 in eye; gill rakers long and stiff, 5+14; lower pharyngeals small, with conical teeth; scales thin, ctenoid; soft dorsal and anal scaly; scales below lateral line in nearly horizontal series; dorsal spines long and slender, separated from soft dorsal; the spine of soft dorsal short and stout; caudal subtruncate, upper lobe longer; anal short and high, second anal spine $2\frac{1}{2}$ in head; ventrals halfway to anal, pectorals $1\frac{2}{3}$ in head. Color dusky silvery, everywhere soiled with dark points, which form faint streaks along the series of scales; snout and anterior part of the chin black; upper part of base of pectoral and axil black. Length 1 foot. West Indies; generally common; a food-fish of some importance. (*dentex*, toothed.)

Corvina dentex, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 139, pl. 109, 1830, San Domingo.

Larimus dentex, GÜNTHER, Cat., II, 269, 1860.

Odontoscion dentex, POEY, Synopsis, 325, 1868; JORDAN & EIGENMANN, *l. c.*, 377, 1889.

1807. ODONTOSCION XANTHOPS, Gilbert.

Head 3; depth $3\frac{2}{7}$; eye $3\frac{3}{4}$ in head; snout $4\frac{1}{3}$. D. XII, 27; A. II, 8; P. 17; pores in lateral line 50. Head and body elongate, compressed, narrow. Dorsal and ventral outlines nearly equally curved; profile slightly depressed over front of orbits, the snout bluntish, not protruding; jaws equal, the lower wholly included, the symphysis prominent, slightly passing the premaxillaries; mouth very oblique, the maxillary reaching slightly behind middle of eye, $2\frac{1}{3}$ in head; tip of maxillary broad; mental and rostral pores of moderate size, not conspicuous; a series of slender canines in lower jaw, preceded by an irregular outer villiform row, most evident toward symphysis; the series of canines turns inward and backward on the symphyseal protuberance, the innermost pair enlarged, directed backward; upper jaw with a series of conical teeth, similar to those on sides of mandible, separated by a considerable interspace from an inner series of very small, close-set teeth, directed backward. Eye very large, subcircular; a definite supraorbital ridge; interorbital width $4\frac{2}{5}$; suborbitals narrow; preopercular margin without definite spines, with minute crenulations, which end in spinous points. Gill rakers long and slender, 16 on horizontal limb of arch, the longest $\frac{2}{5}$ diameter of orbit. Spinous dorsal very high, of weak, flexible spines, none of which is thickened; third spine highest, as long as snout and eye; eleventh spine shortest; second anal spine strong, equaling length of snout and $\frac{1}{2}$ of eye; pectorals short, not reaching tips of ventrals, $1\frac{9}{10}$ in head; ventrals not reaching vent, extending halfway from their base to front of anal; caudal apparently short and rounded, somewhat mutilated in the type, as are the soft dorsal and anal. Scales large, weakly ctenoid except on head, where they are cycloid; maxillary, tip of mandible, and extreme tip of snout naked; head otherwise completely invested; a definite sheath of scales at base of soft dorsal; soft portions of all the vertical fins with membranes scaled. Dark steel gray, with olive tinge above, silvery below, the lower parts coarsely punctate with brown; blackish streaks follow the row of scales, those below the lateral line broad, horizontal, conspicuous, those above lateral line narrower, less intense, the anterior ones directed obliquely upward, those under soft dorsal nearly horizontal; fins dusky, the anal, lower caudal lobe, and the terminal portion of ventrals black; iris bright yellow. Roof of mouth and sides of mandible within orange yellow, the membrane within mandibular teeth black; tongue faintly yellow; a dusky yellow bar above and 1 below pseudobranchiæ, the gill cavity otherwise silvery. Panama; a single specimen 7½ inches long. (Gilbert.) (ξανθός, yellow; ὤψ, eye.)

Odontoscion xanthops, GILBERT, MS., Fishes of Panama, 1898, Panama. (Coll. Gilbert.)

578. CORVULA, Jordan & Eigenmann.

Corvula, JORDAN & EIGENMANN, Review of the Sciænidæ of Europe and America, in Report U. S. Fish Comm. 1886 (1889), 377 (*batabana*).

This genus is closely allied to *Bairdiella* in nearly all respects, but with the preopercle entire and unarmed as in *Larimus*. The species differ considerably among themselves, and they form with *Larimus* and *Odontoscion* an almost continuous series. American. (Diminutive of *Corvus*, crow, as is also the name *Corvina*, applied by the Latin races to fishes of this group, perhaps in allusion to their croaking noise produced by the complicated air bladder.)

a. Body rather short and deep, depth 2½ to 3⅓ in length; distance from insertion of ventrals to first anal spine about equal to depth of body; color silvery, usually with dusky streaks along the rows of scales.
  b. Dorsal rays XI–I, 25; posterior dorsal rays much shorter than the anterior ones; eye very large, 3½ in head; dorsal outline strongly convex, somewhat elevated anteriorly; color dark brown, paler below; upper ⅔ of body with very distinct dark streaks along the rows of scales; pectoral and especially anal with dark points; base of spinous dorsal light yellow; numerous dark dots on belly, lower part of sides, and under side of head. MACROPS, 1808.
  bb. Dorsal rays X–I, 28; posterior rays of soft dorsal higher than the anterior ones; dorsal outline strongly and regularly convex and elevated. Color, silvery white, darker above; sides and back with rather distinct dark lines along the scales; spinous dorsal, tips of ventrals and anal dusky; upper part of head brownish; lower part of head, cheek, and breast with numerous rusty dots, base of soft dorsal and anal rusty. SIALIS, 1809.
  bbb. Dorsal rays X to XII–I, 23 to 25; jaws equal; outer teeth above enlarged, lower teeth nearly uniserial; preopercle with flexible serræ; second anal spine, 3⅔ in head; caudal fin subtruncate.
  c. Maxillary reaching middle of pupil, 2⅓ in head; pectorals rather long. SUBÆQUALIS, 1810.
  cc. Maxillary reaching beyond middle of pupil, 2⅓ in head; pectorals very short; D. XI–I, 23; A. II, 8; color silvery, with very distinct dark longitudinal stripes. SANCTÆ-LUCIÆ, 1811.
aa. Body rather elongate and compressed, the depth 3½ in length; distance from insertion of ventrals to first anal spine ½ greater than depth of body; coloration dusky, with conspicuous dark streaks along the rows of scales. BATABANA, 1812.

1808. CORVULA MACROPS (Steindachner).

(VACUOCUA.)

Head 3½; depth 3. D. XI–I, 25; A. II, 9; scales 8–56–11; eye 3½ in head; snout 4¾; maxillary 2⅙; longest dorsal spine 1¾; longest dorsal ray 2¼; second anal spine 2⅓; ventrals 1½; pectoral 1⅖; caudal fin 1½. Body oblong, moderately compressed, not much elevated; dorsal outline uniform from tip of snout to caudal peduncle; ventral outline rounded from chin to breast, then straight to anal spine, then slanting obliquely upward to caudal peduncle. Snout blunt, shorter than large eye; upper jaw slightly projecting, teeth small and sharp, in 1 or 2 irregular series in lower jaw, in several series in upper jaw, the outer row slightly enlarged; maxillary extending to posterior edge of pupil; chin with 4 large pores; edge of preopercle covered with skin, which is serrated on the edge. Gill rakers slender, 9 + 13; scales ctenoid on the body, cycloid on the head. Spinous dorsal a little higher than soft dorsal; first dorsal spine very short, second about 5 times longer, third twice as long as second, third, fourth, fifth, and sixth subequal, the others rapidly shorter; first anal spine very small, the second many times longer and stouter, but shorter than soft rays; ventrals inserted behind pectorals and reaching beyond them; caudal truncate. Ground color silvery, but so closely set with small dark brown points as to almost obscure the silver; sides with about 4 faint dark cross bands and with conspicuous black stripes following the rows of scales, about 11 horizontal stripes below lateral line, those above slanting obliquely upward anteriorly, but becoming horizontal posteriorly; tips of ventrals and anal black, other fins dusky. Here described from a fine specimen from the Astillero at Mazatlan, 8 inches in length. Pacific Coast of tropical America; recorded only from Mazatlan and Panama; apparently rare; our specimens from Mazatlan and Panama much darker than Steindachner's type, which was deeper, the depth 2½ in length. (*μακρός*, large; *ὤψ*, eye.)

Corvina macrops, STEINDACHNER, Ichth. Beitr., III, 24, fig. 2, 1875, Panama.
Sciæna macrops, JORDAN & GILBERT, Bull. U. S. Fish. Comm. 1881, 316.
Corvula macrops, JORDAN & EIGENMANN, *l. c.*, 379, 1889; JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 468.

1809. **CORVULA SIALIS**, Jordan & Eigenmann.

Head 3⅐; depth 2⅔; eye 5 in head. D. X–I, 28; A. II, 8. Body compressed; the back elevated, regularly rounded from snout to posterior margin of soft dorsal; ventral outline almost straight from chin to first anal spine; base of anal oblique; caudal peduncle short and thick. Profile slightly convex posteriorly, somewhat depressed over the eyes; snout rather acute, slightly longer than eye; eye 1⅓ in interorbital area; preorbital ½ as wide as eye; mouth moderate; maxillary extending past pupil, its length 2⅕ in head; premaxillary anteriorly on level with the lower border of the orbit; lower jaw included; maxillary broad, not entirely concealed by the preorbital when the mouth is shut. Teeth of the lower jaw blunt, conical, in 2 series, those of the inner series much larger than those of the outer; upper jaw with a narrow band of villiform teeth and an outer series of larger teeth, which are remote from each other and decrease in size toward the angle of the mouth. Chin with 5 small pores; snout with 6 pores, arranged in a _-‾-_ shaped figure. Preopercle with a narrow, crenulate, membranous border; opercle with 2 scarcely distinguishable spines; scapular scale entire. Gill rakers moderately developed, about ½ as long as the eye, 5 + 12; pseudobranchiæ large. Scales about the head in front of dorsal and on anterior part of breast cycloid, marked with concentric striæ; those on top of the head embedded, indistinct; scales of the body all ctenoid; membranes of caudal, anal, and soft dorsal densely covered with minute scales nearly to their tips. First dorsal spine short, inserted over the base of the pectoral; fourth dorsal spine highest, reaching to soft dorsal, 1½ in head; anterior dorsal rays shorter than the middle and posterior ones, the eleventh longer than the fourth by an eye's diameter, little more than ½ the length of the head; soft dorsal very broadly rounded posteriorly; caudal short, broad, rounded behind; anal inserted posteriorly, the tips of the anal extending nearly as far as the tips of the dorsal; second anal spine moderate, scarcely more that ⅔ length of the rays, little less than 3 in head; ventrals lanceolate, slightly longer than the rounded pectorals, 1⅓ in head. Color light brownish above, silvery on sides and below, the centers of the scales with many dark dots, these forming horizontal lines along the series of scales below the lateral line, and oblique, irregular, often interrupted, lines above the lateral line; all the fins with dark dots; spinous dorsal dusky; soft dorsal brownish for ⅖ of its height; the other ⅗ pale; anal and tips of ventrals dusky; pectoral pale; head with many minute rusty dots, these aggregated, and forming brownish spots on the maxillary and lower part of the head. Length 6½ inches. Florida Keys; known from 1 specimen. (*σιαλός*, plump.)

Corvula sialis, JORDAN & EIGENMANN, Report U. S. Fish Comm. for 1886 (1889), 379, Key West. (Type, No. 26575. Coll. Silas Stearns.)

1810. CORVULA SUBÆQUALIS (Poey).

Head 3½; depth about 3⅓; eye 4¼ in head; snout 4¼. D. XII–I, 22 to 24; A. II, 9; scales about 46. Form of *Corvula sialis*, but the body more elongate; jaws equal; outer teeth above enlarged, lower teeth nearly uniserial; eye large; snout bluntish; maxillary 2⅓ in head, extending to middle of pupil; preopercle with flexible serræ; second anal spine 3⅔ in head; caudal fin subtruncate. Color silvery, with faint streaks along the rows of scales above. West Indies; scarce. We refer 2 specimens from St. Thomas to this species, although they differ in some respects from Poey's description of *Corvina subæqualis*. The more elongate body and the smaller number of dorsal rays distinguish *subæqualis* readily from *sialis*. (*subæqualis*, nearly equal.)

Corvina subæqualis, POEY, Ann. Lyc. Nat. Hist. New York 1875, 58 Cuba.*
Corvula subæqualis, JORDAN & EIGENMANN, *l. c.*, 380, 1889.

1811. CORVULA SANCTÆ-LUCIÆ, Jordan.

Head 3¼; depth 3⅙; eye 3⅗ in head; snout 4¾. D. XI–I, 23; A. II, 8; scales 6–46–10. Body oblong, moderately compressed, the back moderately elevated. Head rather short and blunt, the anterior profile uniform and slightly arched. Snout short, shorter than eye; eye large, a little greater than interorbital space; mouth considerably oblique, the jaws equal, the premaxillary in front on the level of lower part of pupil, the maxillary extending to beyond line of middle of pupil, 2⅓ in head; teeth of upper jaw in a narrow band, the outer moderately enlarged; teeth of lower jaw moderate, not quite equal, almost in one series; preopercle with its membranous edge finely dentate; gill rakers long and slender, about $x + 15$. Scales large and firm, those above lateral line anteriorly in series parallel with it; at a point below last dorsal rays each series is suddenly bent upward, and then again becomes horizontal; rows of scales below lateral line horizontal and nearly straight. Dorsal spines slender; soft dorsal and anal scaly at base; caudal (broken) apparently subtruncate; pectoral very short, reaching about to eighth dorsal spine; anal small, inserted backward, its second spine moderate. Distance from insertion of ventral to first anal spine 1⅕ times depth of body. Coloration silvery, with about 14 horizontal dark stripes, these stripes continuous, and those above bend upward underneath last dorsal spines; fins pale yellowish, all more or less soiled with dark points; a faint dark axillary spot; lining of gill cavity pale. West Indies; 1 specimen known, 5¾ inches long, from Port Castries, Island of St. Lucia. (*Sanctæ-luciæ*, St. Lucia.)

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* The following is the substance of Poey's account of his *Corvina subæqualis:* Body rather elongate; eye 3⅓ in head; snout short, rounded; mouth moderate; maxillary extending to below anterior margin of pupil, the jaws subequal; teeth in fine bands, the outer series longer, and larger above than below; symphisis with 4 pores; preopercle finely dentate; dorsal fins separated; second dorsal spine stout; caudal with a salient angle; base of anal scaly; anal spine rather strong, its insertion rather posterior; color silvery; depth 3⅚ (with caudal); head 3⅚. D. X–I, 25; A. II, 7.

Corvula sanctæ-luciæ, JORDAN, Proc. U. S. Nat. Mus. 1889, 649, Port Castries, St. Lucia. (Type, No. 41732. Coll. *Albatross*.)

1812. CORVULA BATABANA (Poey).

Head 3⅗; depth 3½; eye 4½; snout 3½. D. XI–I, 26; A. II, 8; scales 6–50–7. Body oblong, compressed, the depth nearly uniform from ventrals to vent; belly very long, the distance from ventrals to anal ½ greater than depth of body; profile nearly straight and horizontal; mouth rather wide; maxillary 2⅓ in head, reaching middle of eye; upper jaw with several series of minute teeth and an outer somewhat enlarged series; lower jaw with a single series of rather strong teeth, a pair of minute canine-like teeth at the symphysis; snout short, without pores; chin with 5 large pores; preopercle with a crenulate, dermal border; gill rakers slightly longer than pupil, $5 + 13$; lower pharyngeals with many small teeth, some of the inner ones much elongate; eye slightly shorter than snout, about equal to the interorbital area; scales large, their exposed edges much striated, th striæ ending in cilia; scales below lateral line in undulate, subhorizonta series; lateral line slightly curved, becoming straight above anal; soft portions of vertical fins densely covered with scales; soft dorsal and ana with a scaly sheath at their bases; dorsal, caudal and anal rounded behind; ventrals slightly longer than pectorals, 1 4/7 in head. Color coppery-grayish, with many minute brown points; scales of back and sides each with a dark spot, these forming very distinct dusky stripes along the series of scales; stripes below the lateral line mostly of continuous spots, those above broken and irregular; upper part of head and fins uniform brownish, with many minute points. Cuba and Porto Rico; not rare, but not seen elsewhere; our specimen from Havana. Its strongly marked coloration is a very unusual trait in this family. (*Batabano*, the type locality.)

Johnius batabanus, POEY, Memorias, II, 184, 1860, Batabano, South coast of Cuba; POEY, Fauna Puerto-Riqueña, 327, 1881.
Larimus batabanus, JORDAN, Proc. U. S. Nat. Mus. 1886, 43.
Corvula batabana. JORDAN & EIGENMANN, *l. c.*, 380, 1889.

579. ELATTARCHUS, Jordan & Evermann.

Elattarchus, JORDAN & EVERMANN, Check-List, 397. 1896 (*archidium*).

This genus is very close to *Bairdiella* from which it differs in the presence of slender canines, much as in *Odontoscion*. From the latter genus it differs mainly in the serrate preopercle, which has a downward directed spine at the angle. Second anal spine very small. One species known. (ἐλάττων, reduced; ἀρχός, anus, from the small anal fin.)

1813. ELATTARCHUS ARCHIDIUM (Jordan & Gilbert).

Head 3; depth $3\frac{1}{2}$. D. XI, 24; A. II, 8; scales 9–50–7, 52 pores. Diameter of eye about equal to length of snout, or to interorbital width, and $4\frac{1}{2}$ times in length of head. Length of maxillary $2\frac{1}{4}$ in head. Gill rakers low and slender, 6 + 13 in number. Pseudobranchiæ well developed; posterior nostril a narrow oblong vertical slit. Head and body rather elongate, considerably compressed, back not elevated, the snout somewhat gibbous, the profile depressed above the eyes. Mouth very large, terminal, oblique, the maxillary reaching vertical from posterior margin of pupil; jaws subequal, premaxillaries in front on the level of lower edge of pupil; symphysis of lower jaw with an oblong knob, which projects inward and upward, on this are 2 series of teeth, 3 in each series, the inner pair being canines of moderate size, larger than any of the other teeth, but much smaller and slenderer than the canines in *Cynoscion*. Both jaws without villiform teeth, upper jaw with 2 series of slender-pointed teeth, the outer series enlarged; lower jaw laterally with a single series of teeth similar to those of the outer series of upper jaw, but larger; those in the middle of the jaw largest. Posterior margin of preopercle inclined downward and backward, both margins convex and with the angle broadly rounded. Both margins with weak, distinct serrations; posterior border with 2 or 3 stronger teeth next the angle directed backward, the angle with 1 robust flattish spine directed more or less vertically downward. Spinous dorsal with very weak, flexible spines, the third the longest and about $\frac{1}{2}$ length of head; soft dorsal moderate, the longest ray shorter than the dorsal spines but more than $\frac{1}{3}$ length of head; caudal fin subtruncate or slightly emarginate; anal fin very small, posteriorly inserted, its base but little oblique; length of base about equal to length of snout; second anal spine moderate, shorter than the first soft ray, much stronger than the dorsal spines, and inflexible, its length about equal to snout and $\frac{1}{2}$ of eye, 3 in head; distance from front of anal to middle of base of caudal slightly more than $\frac{1}{4}$ the length of the body; distance from vent to front of anal about equal to length of base of anal; pectoral short, not reaching tips of ventrals, its length $1\frac{3}{4}$ in head; ventrals reaching halfway to front of anal, not nearly to vent; membranes of soft parts of vertical fins with series of scales extending more than halfway to the tips.

Lateral line scarcely arched, becoming straight opposite front of soft dorsal. Color lustrous bluish gray above, silvery below; middle of sides with indistinct lengthwise streaks formed by clusters of dark dots in the centers of the scales; snout and tips of lower jaw blackish; a dark blotch on opercle above; sides of head bright silvery; fins light straw-color; upper half of pectorals dusky; spinous dorsal finely speckled with black; upper half of axil brown; peritoneum pale; lining of opercle black above. Iris bright yellow, dusky above. Length 7 inches. Panama; not uncommon. The species has the very small anal of *Odontoscion* and the spur-like preopercular spine of *Bairdiella,* while in its dentition it is intermediate. (*αρχίδιον,* diminutive of *ἀρχός,* anus or anal.)

Odontoscion archidium, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 317, Panama (Coll. C. H. Gilbert); JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 111.
Bairdiella archidium, JORDAN & EIGENMANN, *l. c.*, 386, 1889.

580. BAIRDIELLA, Gill.

(MADEMOISELLES.)

Bairdiella, GILL, Cat. Fish. East Coast North America, 33, 1861 (*argyroleuca*=*chrysura*)
Nector, JORDAN & EVERMANN, new subgenus (*chrysoleuca*).

This genus is characterized by the oblique mouth, little cavernous skull, few rows of small teeth, slender gill rakers, and the preopercle armed with a plectroid spine. It is certainly a very natural group, and worthy of recognition as a distinct genus, although its relationships with *Ophioscion* and especially with *Stellifer* are very close. The numerous species are all American, all small in size and silvery in coloration, and some of them are remarkable for the great size of the second anal spine. In others this spine is quite small. These variations among species unquestionably closely allied show how slight is the systematic value to be attached to the size of this spine. (Named for Prof. Spencer Fullerton Baird, for many years United States Commissioner of Fish and Fisheries, and one of the most broad-minded and successful workers in systematic zoology.)

BAIRDIELLA:

a. Teeth of the lower jaw unequal, chiefly biserial; the inner teeth more or less enlarged; preorbital narrow.

  b. Second anal spine moderate, $2\frac{1}{3}$ in head, not so long as soft rays, not reaching tip of last ray when depressed. Color silvery, punctate; fins yellow; depth 3 in length. D. X–I, 22; A. II, 10. CHRYSURA, 1814.

  bb. Second anal spine very long, $\frac{2}{3}$ length of head, reaching beyond tip of last ray; base of anal oblique, forming an angle with ventral outline.

    c. Mouth terminal, very oblique; second anal spine excessively large, $1\frac{2}{7}$ in head, longer than any soft ray. Color silvery; depth $3\frac{1}{3}$. D. X–I, 23. ENSIFERA, 1815.

    cc. Mouth not quite terminal; preorbital narrow, but broader than in *ensifera.*

      d. Dorsal rays X–I, 28; dorsal spines very slender, the highest $1\frac{1}{2}$ in head; pectorals $1\frac{1}{3}$ in head; second anal spine very long, silvery, punctate. a dark axillary spot; depth $3\frac{1}{4}$ in length. ICISTIA, 1816.

      dd. Dorsal rays X–I, 23; dorsal spines stiff, lower, the highest 2 in head; second anal spine $1\frac{2}{5}$; pectorals $1\frac{3}{5}$. Color soiled silvery; depth $3\frac{1}{7}$. RONCHUS, 1817.

NECTOR (*nector*, one that connects; *Bairdella* with *Ophioscion*):

- *aa.* Teeth of lower jaw in a narrow villiform band as in *Ophioscion;* mouth subinferior, little oblique, preorbital broader, gill rakers shorter; pores and slits on snout more conspicuous.
  - *e.* Snout sharp; head slender, narrow above; second anal spine very large, 1⅔ in head; pectoral short, 1½ in head. Color soiled silvery. D. X–I, 21; head 3 in length. ARMATA, 1818.
  - *ee.* Snout bluntish, the head stout and broad above; second anal spine shortish, 2 in head. Color dusky; depth about 3 in length.
    - *f.* Dorsal rays X–I, 18; scales large, 44 in lateral line; pectoral 1⅕ in head. Color dark brownish, dotted. ALUTA, 1819.
    - *ff.* Dorsal rays X–I, 21 or 22; scales moderate, 50 to 55; pectoral 1¼ in head; caudal 1½; preorbital broad. Color soiled brassy, with dark streaks and mottlings. CHRYSOLEUCA, 1820.

Subgenus BAIRDIELLA.

1814. BAIRDIELLA CHRYSURA (Lacépède).

(MADEMOISELLE; YELLOW-TAIL.)

Head 3 to 3⅓; depth 3 to 3⅓; eye 4¼ in head; snout 4¼. D. XI–I, 22; A. II, 10; scales 8–52–12. Body oblong, compressed, the back a little elevated, the profile depressed over the eyes; snout prominent, bluntish, as long as eye; lower jaw with a single series of close-set teeth, in front of which are a few smaller teeth not forming a definite series; upper jaw with an outer series of small curved canines, behind which is a moderate band of villiform teeth, becoming wider laterally. Preopercle serrate, the teeth near the angle larger, the lowest and largest directed downward; gill rakers slender, rather long, 8+16; scales on head cycloid; base of anal little oblique; ventral outline rather regularly rounded; dorsal spines slender, the highest 2¼ in head; caudal long, double truncate; pectorals about as long as the ventrals, 1⅗ in head; soft dorsal and anal scaled at least ½ their height. Second anal spine moderate, 2⅓ in head, not as long as the soft rays, not reaching to tip of last ray when depressed; mouth large, somewhat oblique, the premaxillary on the level of lower part of the eye; maxillary reaching middle of eye, 2⅗ in head. Color greenish above, silvery below; back and sides more or less densely punctate with dark dots (especially in northern specimens), these forming narrow, somewhat irregular streaks along the sides; fins plain, mostly yellow in life. South Atlantic and Gulf coasts of the United States, north to New York; very abundant on our sandy shores from Long Island to Texas. It reaches but a small size, hence, although an excellent pan fish, it has no great economic value. Unlike most of the other species of the genus, its second anal spine is little enlarged. (*χρυσός*, gold; *οὐρά*, tail.)

Perca punctata, LINNÆUS, Syst. Nat., Ed. XII, 482, 1766, in part, South Carolina (not *Perca punctatus* of Ed. X, which is *Bodianus fulvus punctatus*).

Dipterodon chrysurus, LACÉPÈDE, Hist. Nat. Poiss., III, 64, 1802, South Carolina; after LINNÆUS.

Bodianus argyroleucus et exiguus, MITCHILL, Trans. Lit. & Phil. Soc. New York 1815, 417 and 419, pl. 6, fig. 3, New York.

Bodianus pallidus, MITCHILL, Trans. Lit. & Phil. Soc., I, 1815, 420, New York.

Homoprion xanthurus, HOLBROOK, Ich. S. Car., Ed. 1, 170, pl. 24, 1856 (not *Leiostomus xanthurus*, LACÉPÈDE).

Homoprion subtruncatus, GILL, Cat. Fish. E. Coast U. S., 33, 1861, South Carolina; after HOLBROOK.

Corvina argyroleuca, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 105, 1830; GÜNTHER, Cat., II, 299, 1860.

Bairdiella punctata, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 377.

Bairdiella argyroleuca, GOODE, Proc. U. S. Nat. Mus. 1879, 113.

Sciæna punctata, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 280; JORDAN & GILBERT, Synopsis, 570, 1883.

Sciæna chrysura, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 606; JORDAN & GILBERT, Synopsis, 933, 1883.

Bairdiella chrysura, GOODE, Hist. Aquat. Anim., 375, pl. 126, 1884; JORDAN & EIGENMANN, *l. c.*, 386, 1889.

1815. BAIRDIELLA ENSIFERA (Jordan & Gilbert).

Head 3½ to 3⅓; depth 3¼ to 3⅓; eye 3¾ in head; snout 5. D. X–I 22; A. II, 8; scales 8–49–9. Body compressed, moderately elongate, the back little elevated; snout short, bluntish, not protruding, the profile nearly straight and not very steep to base of first dorsal, along the base of which it is nearly horizontal, thence again declining along base of soft dorsal; ventral outline nearly straight to front of anal, then very sharply angulated, the base of the anal very oblique; caudal peduncle long and slender. Profile depressed above head; head moderate, compressed with vertical cheeks; preorbital very narrow, narrower than pupil; snout not projecting so far as premaxillaries; premaxillaries in front on the level of lower part of pupil; maxillary extending to opposite middle of pupil; mouth very oblique, the jaws nearly even in front, the lower very slightly included, the gap 2⅓ in head. Teeth slender, small, those in upper jaw in 2 or 3 series, the outer series enlarged; most of the teeth depressible; lower teeth unequal, chiefly biserial, the inner enlarged; symphysis of lower jaw with a slight inwardly projecting knob, bearing teeth a little larger than the others. Chin with 4 distinct pores, the outer pair round. Interorbital space moderate, slightly convex, a little broader than length of snout, 4 in head. Eye very large, considerably longer than snout. Preopercle with strong teeth, which grow stronger toward the angle, the lowest tooth very strong and directed downward and forward; opercular spines blunt and flattish; gill rakers numerous, long and slender, ½ length of eye, 8+16 in number; scales roughish, extending up on soft portions of vertical fins, covering about ⅓ of the soft dorsal and more of the anal. Lateral line not strongly curved, becoming straight in front of anal. First dorsal high, its spines slenderer than in *B. armata*, stouter than in *B. icistia*, the second spine short, slender, very stout, ½ the length of the third, which is 1¾ in length of head. Soft dorsal rather high, its longest rays a little less than ½ head. Caudal subtruncate, the middle and upper rays slightly produced, its length 1⅓ in head. Distance from front of anal to caudal 3¼ in length of body; abdomen extremely long, its length ⅓ greater than length of head; posterior outline of anal fin concave, its second spine very long and strong, scarcely shorter than soft rays, its length 1⅓ in head, its distance from the vent ⅔ its length; ventrals long, $1\frac{2}{5}$ in length of head, reaching beyond tips of pectorals, but not quite to vent; pectorals rather short, $1\frac{2}{5}$ in head. Color bluish gray above and on sides, silvery below; a dark, ill-defined bluish-gray blotch on upper anterior angle of opercle; mouth yellow within, blackish toward tip of lower jaw; spinous dorsal translucent, with dark punctulations and a narrow black margin, or sometimes largely blackish; soft dorsal dusky yellow; caudal and anterior 3 rays of anal brighter yellow; caudal and membrane between spine and first soft ray of anal with black punctulations; posterior anal rays white; ventrals immaculate; pectorals with upper half of axil and membrane of upper rays internally brownish, the upper rays with a slight yellowish tint externally. Length a foot. Panama; rather common. Of all the American Sciænoids this species has the largest anal spine in proportion to the size of the body. (*ensis*, sword; *fero*, I bear.)

Sciæna ensifera, Jordan & Gilbert, Bull. U. S. Fish Comm. 1881, 313, Panama; Punta Arenas. (Coll. C. H. Gilbert.)

Corvina fulgens, Vaillant, Miss. Sci. au Mexique, 164. 1883, Pacific Coast of Mexico.

Bairdiella ensifera, Jordan & Eigenmann, *l. c.*, 387, 1889.

1816. BAIRDIELLA ICISTIA (Jordan & Gilbert).

(Corbineta.)

Head $3\frac{1}{4}$ to $3\frac{1}{2}$; depth $3\frac{1}{4}$ to $3\frac{1}{2}$. D. X-I, 28; A. II, 8; scales 8-51-10. Body elongate, compressed, the back a little elevated; snout very short, compressed, and rather blunt, 4 in head; mouth moderately wide, oblique; lower jaw somewhat included; maxillary reaching vertical from posterior margin of pupil, $2\frac{2}{3}$ in head; upper jaw with a narrow band of villiform teeth and an external series of somewhat larger teeth; lower jaw with 1 or 2 series of teeth smaller than the enlarged teeth of upper jaw and more close-set; in front this series broadens into a narrow band. Chin with 4 pores; premaxillaries on the level of lower part of pupil, projecting beyond snout. Interorbital region slightly depressed. Gill rakers long and strong, about 6 + 17 in number. Preopercle with its lower edge smooth, the posterior edge armed with distinct spines, the 3 spines nearest the angle much the longest, the lowest directed vertically downward and somewhat forward. Eye large, its diameter slightly less than length of snout or than iterorbital width, $4\frac{2}{3}$ in length of head. Scales rather small; series of small scales on membrane of dorsal and anal; lateral line little arched, becoming straight opposite interval between vent and anal. Spinous dorsal high, the spines all very slender, weak, and flexible, more slender than in other species of this subgenus, the third and fourth about equal, much longer than the others, the upper margin of the fin very oblique; the longest spine about $\frac{7}{10}$ length of head, much longer than the soft rays, which are about $3\frac{1}{3}$ in head; second anal spine exceedingly strong, $1\frac{3}{4}$ in head, about $\frac{4}{5}$ length of fourth dorsal spine, and about as long as first soft ray of anal; middle rays of caudal slightly produced, $1\frac{1}{2}$ in head, the fin subtruncate; ventrals long, their length more than $\frac{1}{2}$ the distance from their base to origin of anal; pectorals not reaching vertical from tips of ventrals, about equal to them in length, $1\frac{1}{2}$

in head. Color grayish silvery above, silvery on sides and below; dorsal region with faint streaks produced by darker centers of the scales; spinous dorsal blackish, darker on membrane of first spine, the soft portion as well as the caudal yellowish dusky; ventrals and pectorals pale, each with a faint yellowish blotch; axil of pectoral black above; anal pale. Pacific coast of Mexico; rather common about Mazatlan; readily distinguished from other species by the weakness of its dorsal spines, as well as by the large number of the soft rays. (*εἴκώ* to yield; *ἱστίον*, sail, from the slenderness of its species.)

Sciæna icistia, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 356, Mazatlan. (Types, Nos. 28182, 28228, 28275, 28368, 29566, 29613, 29615, 29775, 29790. Coll. Gilbert.)

Bairdiella icistia, JORDAN & EIGENMANN, *l. c.*, 387, 1889.

1817. BAIRDIELLA RONCHUS (Cuvier & Valenciennes).

(RONCO; GROUND DRUMMER.)

Head $3\frac{1}{7}$; depth $3\frac{1}{7}$; eye $4\frac{1}{3}$ in head. D. X–I, 23; A. II, 8; scales 7–50–8. Body oblong, compressed, scarcely angular in outline; profile straight, rather steep, the snout short and rather acute; eye as long as snout; mouth moderate, nearly horizontal; premaxillary on level of lower part of orbit; maxillary reaching beyond middle of eye, $2\frac{3}{5}$ in head; teeth as in *Bairdiella icistia*; preopercle strongly serrate; gill-rakers 9+18. Dorsal spines rather stiff, the highest 2 in head; second anal spine rather strong, curved, $1\frac{2}{5}$ in head, as long as first soft ray, and reaching beyond tips of other rays. Ventrals slightly longer than pectorals, which are $1\frac{3}{5}$ in head; caudal truncate. Color soiled grayish above, silvery below; faint, dark streaks along the rows of scales; spinous dorsal and anterior part of anal densely covered with dark dots. Length 6 inches. Atlantic coasts of tropical America, generally common in the West Indies and along the coast of Brazil;* a food-fish of some importance, but small in size; our specimens from Havana. (*Ronco*, grunter or croaker, the Spanish name of various species of *Hæmulon*, *Pomadasis*, *Bairdiella*, etc., from *roncar*, to snore, or to make a rough or raucous noise.)

Corvina ronchus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 107, 1830, Maracaibo; Surinam; GÜNTHER, Cat. Fish. Brit. Mus., II, 299, 1860; GÜNTHER, Fishes Central America, 387, 1869.

Bairdiella ronchus, POEY, Synopsis, 324, 1868.

Sciæna ronchus, JORDAN, Proc. U. S. Nat. Mus. 1886, 44.

Bairdiella ronchus, JORDAN & EIGENMANN, *l. c.*, 388, 1889.

Subgenus NECTOR, Jordan & Evermann.

1818. BAIRDIELLA ARMATA, Gill.

Head 3 to $3\frac{1}{4}$; depth 3; eye $4\frac{2}{3}$ in head; snout 4. D. XI–I, 21; A. II, 8; scales 7–51–9. Snout sharp, the head slender, narrow above, the interorbital space not broader than eye; anal spine very long and strong, 1⅜ in head; pectoral fin short, 1½ in head; form of body irregularly rhomboidal, the base of the anal fin being oblique; profile almost straight anteriorly; eye moderate, slightly shorter than snout; mouth large, inferior, almost horizontal, maxillary reaching beyond pupil, 2⅗ in head. Mouth inferior or subinferior, little oblique; preorbital broader, gill rakers shorter, and pores and slits on snout more conspicuous than in other species. Upper jaw with a band of villiform teeth and an outer series of enlarged teeth; lower teeth in a moderate band, the inner series slightly enlarged, especially in young examples; gill rakers comparatively short, 8 + 15; dorsal spines short and stout, slightly more than 2 in head; caudal rounded; anal spine 1⅔ in head; basal half of the soft dorsal and anal covered with scales. Color, bluish above, silvery below, a rather broad area from snout to caudal covered with brownish dots; upper fins and anterior half of anal with many dots.* Both coasts of tropical America; not uncommon on the Pacific coast about Panama, and equally abundant on the Atlantic coast, where it seems to ascend the rivers. (*armatus*, armed.)

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* Many specimens from Rio Janeiro and from Havana are in the museum at Cambridge. There is considerable individual variation, but there seems to be no specific difference between Cuban and Brazilian examples. A number of specimens in poor condition are also in the museum, supposed to have been obtained by Captain Perry at Vera Cruz. These have the snout longer, the eye smaller, and the fins higher than usual in *ronchus*, and they may represent a different species. In these the snout is 4 in head, the eye $4\frac{1}{2}$, the longest dorsal spines $1\frac{3}{4}$, the second anal spine $1\frac{2}{7}$. D, X–I, 24.

Bairdiella armata, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 164, west coast Central America; JORDAN & EIGENMANN, *l. c.*, 388, 1889.

Corvina acutirostris, STEINDACHNER, Ichth. Beitr., III, 28, pl. 4, 1875, Panama.

Corvina armata, GÜNTHER, Fishes Central America, 387 and 428, 1869.

Corvina (*Homoprion*) *acutirostris*, STEINDACHNER, Zur Fisch-Fauna des Magdalenen-Stromes, 9, 1878.

1819. BAIRDIELLA ALUTA, Jordan & Gilbert.

Head 3⅗; depth 3¼; D. X–I, 18; A. II, 8; scales 44, 5 in a vertical series from front of dorsal to lateral line. Form rather elongate, the back a little elevated and compressed; caudal peduncle especially long and slender; head rather broad above the eyes, somewhat depressed, so that the anterior profile is a little concave, in front of which the snout is rather abruptly truncate; interorbital space a little broader than the large eye, the diameter of which is about equal to the length of the snout, and contained about 4 times in the length of the head. Width of preorbital ⅖ diameter of eye. Preopercle strongly serrated, the 3 lowest serrae radiating, the lowest and largest one turned downward and forward; lower jaw included, considerably shorter than upper; snout scarcely projecting beyond premaxillaries; mouth nearly horizontal; premaxillaries much below the level of the eye; maxillary extending to just beyond middle of eye. Teeth in both jaws in narrow villiform bands, the outer teeth in the upper jaw somewhat enlarged, those in the lower jaw all small. Sides and top of head somewhat cavernous, the surface yielding to the touch. Gill rakers shortish, rather slender, about as long as pupil; pseudobranchiae large. Dorsal fin divided nearly to base, the spines not very high, rather flexible, the longest little more than ½ length of head, second spine a little shorter than third and nearly as high; second dorsal rather low; second anal spine strong, about ½ length of head, ¾ height of the soft rays; distance from front of anal to caudal 1¾ in length of body; distance from vent to anal a little more than ½ length of second anal spine; caudal fin long, double truncate, the middle rays produced, as long as from snout to edge of preopercle; caudal peduncle (from end of anal) 1⅕ in head; anal ending in advance of end of dorsal, its first spine in advance of middle of soft dorsal; ventrals long, the second ray filamentous, reaching vent; pectorals rather short, as long as caudal. Scales large, those on breast not much smaller; soft parts of vertical fins scaly toward the base. Lower pharyngeals narrow, with small, slender, pointed teeth, those of the series on the inner edge of the bone much enlarged, also very slender. Color light reddish brown, dingy with dark punctulations; ground color a light coppery shade, little silvery; each scale with many dark points and a smutty edging; the general hue the same above and below; no distinct markings; preorbital of a soiled silvery; fins similarly dusky, the caudal yellowish, the anal almost black; inside of opercle dusky.

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* *Bairdiella armata* is close to *Bairdiella ronchus*, and the character of the dentition of the lower jaw, which we have used to divide *Bairdiella* into minor groups, becomes here of slight importance. We have examined specimens of this species from Panama, Rio Magdalena, San Matheo, Camaru, Cannarivieras, Curuça, Bahia, Pernambuco, Maranhão, and Itabapuana. The specimen from the latter locality (10837, M. C. Z.) is nearly a foot long, and has the spines a little shorter and stouter than in Panama examples.

This species strongly resembles *Bairdiella chrysoleuca*, apparently differing only in the larger scales, fewer dorsal rays, longer caudal fin, and larger eyes. The 2 characters last mentioned may be due to youth, the type of *aluta* being smaller than any *chrysoleuca* examined by us. The other characters are possibly results of extreme variation, and the 2 nominal species may prove to be identical. Pacific coast of Central America; known only from the original type, 7½ inches long. (*ἀλουτός*, unwashed.)

Sciæna aluta, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 232, La Union, San Salvador. (Type, No. 28129. Coll. Capt. Henry E. Nichols.)
Bairdiella aluta, JORDAN & EIGENMANN, *l. c.*, 389, 1889.

1820. BAIRDIELLA CHRYSOLEUCA (Günther).

Head 3⅙; depth 3; eye 5 in head; snout 4. D. X–I, 21 or 22; A. II, 9; scales 6–50 to 55–13. Back somewhat elevated, the form of the body much as in *Ophioscion scierus* and related species; preorbital broader than in other species of *Bairdiella*, ⅘ width of eye; pores on snout more conspicuous than in other species; snout bluntish; interorbital space 3⅔; head thick, somewhat more cavernous than in related forms; mouth subinferior, little oblique; premaxillary entirely below level of eye; maxillary 2⅗ in head; teeth of outer series of upper jaw enlarged, teeth of lower jaw in a narrow, villiform band; lowest serræ on preopercle smaller and less turned forward than in the other species; dorsal spines rather stout, the second strong, the third longest, 1¾ in head; second anal spine shorter than the soft rays, 2¼ in head, the form and size of these spines very variable; gill rakers short and slender, $x + 15$, the longest not as long as pupil; caudal fin double truncate; pectoral 1¼ in head; caudal 1½ in head. Color soiled brassy, irregularly mottled with large patches of shining golden brown; faint dark stripes along the rows of scales above, those below lateral line nearly horizontal, those above oblique.* Panama, apparently rare; quite variable, especially in the armature of its preopercle. (*χρυσός*, gold; *λευκός*, white.)

Corvina chrysoleuca, GÜNTHER, Fish. Central America, 387 and 427, pl. 67, fig. 1, 1869, Panama.
Sciæna chrysoleuca, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 316.
Bairdiella chrysoleuca, JORDAN & EIGENMANN, *l. c.*, 389, 1889.

581. STELLIFER (Cuvier) Oken.

Les Stellifères, CUVIER, Règne Animal, Ed. I, 283, 1817 (*stellifer*).
Stellifer (CUVIER) OKEN, Isis, 1182, 1817 (*stellifer*).
Stelliferus, STARK, Elements Nat. Hist., I, 459, 1828 (*stellifer*).
Homoprion,† HOLBROOK, Ichth. S. Carol., 1st ed., 168, 1856 (*lanceolata*).
Zestis, GILBERT, new subgenus (*oscitans*).
Zestidium, GILBERT, new subgenus (*illecebrosus*).
Stellicarens, GILBERT, new subgenus (*zestocarus*).

This genus is composed of small species, all American, allied to *Bairdiella* and *Ophioscion*, but distinguished by the remarkably spongy and cavernous construction of the bones of the skull. The septa are reduced to the thinness of the walls of honeycomb. The skull is also very broad and much depressed between the eyes. The species vary considerably among themselves in these and other respects, and may be thrown into 4 subgenera, distinguished by the armature of the preopercle. (*stella*, star; *fero*, I bear, from the radiated appearance of the spongy suborbitals; "L'étoile que ce poisson porte a l'œil, m'a engagé a le denommer" (Bloch).

ZESTIS (*ζεστός*, soft-boiled):

I. Preopercle with two strong spines only, the uppermost directed backward, the lower downward.
  a. Jaws subequal, the mouth very oblique, large; teeth of lower jaw unequal, the inner series enlarged. OSCITANS, 1821.
  aa. Jaws unequal, the lower short and included; mouth less oblique; teeth of lower jaw in a villiform band, subequal.
    b. Mouth moderate, the maxillary 2½ in head; lower spine of preopercle directed downward and forward. FURTHI, 1822.
II. Preopercle serrate, its spinules 6 to 20.
  ZESTIDIUM (diminutive of *Zestis*):
    c. Lowermost spinule of preopercle directed downwards; body robust.
      d. Dorsal rays XIV, 20 or 21; pectorals short, 1⅗ in head; gill rakers 5+10; coloration dark. ILLECEBROSUS, 1823.
  STELLIFER:
    cc. Lowermost spinule of preopercle not directed downwards; caudal fin pointed.
      e. Mouth large, oblique, the maxillary 2 to 2½ in length of head; snout very short, little projecting.
        f. Preopercle with 3 or 4 spines next the angle, divergent, considerably larger than the others.

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* This species, although technically a *Bairdiella*, shows numerous affinities with *Ophioscion scierus* and other species of that genus. It marks the transition from one group of Sciænoids to the other, from those related to *Larimus* to those allied to *Sciæna*.

† The generic name *Homoprion* was based on a species each of *Stellifer* and *Bairdiella*. It was restricted by Gill to the former group, and should therefore be regarded as a synonym of *Stellifer*.

g. Pectoral fin long, $1\frac{1}{6}$ in head; body deep, compressed: head short, deep, more compressed than in related species, the interorbital space less depressed, its width $3\frac{1}{3}$ in head, the supraocular ridges less prominent. D. XI-I, 19. STELLIFER, 1824.

gg. Pectoral fin short, about $1\frac{2}{3}$ in head; interorbital space 3 in head; second anal spine $2\frac{1}{4}$; body rather slender; snout as long as eye, $4\frac{1}{3}$ in head: mouth moderate, oblique, the maxillary not quite $\frac{1}{2}$ length of head, extending just past pupil. D. XI–I, 20 to 23. LANCEOLATUS, 1825.

ff. Preopercle with numerous short, straight spinules, which decrease in size regularly from angle upward; mouth terminal, the maxillary $2\frac{2}{3}$ in head; head extremely spongy. pectorals $1\frac{1}{5}$ in head. D. XII–I, 23 or 24. ERICYMBA, 1826.

ee. Mouth small, inferior, nearly horizontal, the maxillary 3 to $3\frac{1}{2}$ in head; snout thick, blunt, and protuberent: eye small, 5 to 6 in head; teeth on preopercle subequal; preorbital thick and swollen, much broader than eye: body moderately elongate. D. X–I, 19. MICROPS, 1827.

STELLICARENS (***stella***, star; *carens*, lacking):

III. Preopercle without bony serræ, or with a single somewhat flexible point. D. XII–19; mouth large, oblique; head narrow, very spongy; pectorals $1\frac{1}{2}$ in head. ZESTOCARUS, 1828.

Subgenus ZESTIS, Gilbert.

1821. STELLIFER OSCITANS (Jordan & Gilbert).

Head $3\frac{3}{5}$; depth 3; eye $4\frac{2}{3}$ in head; snout $4\frac{2}{3}$. D. XI–I, 22; A. II, 8; scales 6–53–9, 47 pores. Body oblong, the back somewhat elevated; head very wide and heavy, almost quadrate, flat above; cheeks nearly vertical; cranium above, as well as preorbital and preopercle, cavernous, yielding to the touch; snout heavy, projecting a little beyond premaxillaries, much broader than long, its length 4 in head; interorbital space very broad and flat, its breadth $2\frac{2}{5}$ times in length of head; greatest width of head $\frac{2}{3}$ its greatest height; eye moderate, its diameter equal to $\frac{1}{2}$ the interorbital space; supraorbital rim slightly elevated.

Mouth very wide and oblique, the lower jaw included; length of gape twice in length of head; premaxillaries anteriorly on the level of the lower part of pupil; maxillary reaching well beyond the posterior margin of the orbit; chin with a small but distinct knob, the pores around it not well marked. Teeth small, not forming villiform bands, in 2 rather irregular series in each jaw, the outer teeth in upper jaw somewhat enlarged, the large teeth fewer in number and larger than in *S. furthi*. Gill rakers numerous, very fine and slender, the largest about $\frac{2}{3}$ diameter of orbit, 21 + 27. Pseudobranchiæ quite small. Preopercle with its angle evenly rounded, the upper and lower limbs nearly equal, the membranaceous margin minutely serrulate; above the angle is a short, very strong spine directed backwards, and at the angle is a similar one directed obliquely downward and backward; no other stiff spines on the preopercle. First and second spines of the dorsal strong and inflexible, second spine about $\frac{1}{3}$ length of head; third spine longest, about $\frac{1}{2}$ as long as head, and like the succeeding spines very slender and flexible; eleventh and twelfth spines longer and stronger than the tenth; soft dorsal anteriorly about as high as the third spine; anal short, its second spine long and very strong, much stronger than second dorsal spine and longer than the third, its length rather more than ½ the length of the head; shorter than soft rays, its tip not reaching when depressed to end of soft rays; distance from vent to second anal spine considerably less than length of second anal spine; caudal rounded, the middle rays produced, its length a little less than ½ that of head; pectorals broad, reaching almost to vent, about equal to length of head; ventrals not reaching nearly to vent; soft dorsal, anal, and caudal fins thickly scaled to their tips; the spinous dorsal with a thick scaly sheath at base, each spine with a series of scales; other fins more or less scaly.

Scales large; lateral line with a wide low curve anteriorly, becoming straight in front of origin of anal; tubes of lateral line branched anteriorly. Coloration dusky above, pale below, with some silvery luster; middle of sides conspicuously punctulate; upper fins all brownish, punctulate with darker; ventrals, anal, and pectoral pale; the anal and pectoral dusted with dark points; opercle blackish within; peritoneum dusky silvery. Panama; not uncommon. In the dentition and form of its mouth it differs from the other species, approaching the genus *Bairdiella*. (*oscitans*, yawning.)

Sciæna oscitans, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 312, Bay of Panama (Coll. C. H. Gilbert); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 376.
Stelliferus oscitans, JORDAN & EIGENMANN, *l. c.*, 393, 1889.

1822. STELLIFER FURTHI* (Steindachner).

Head 3⅖; depth 2⅔ to 3; eye 4⅔ in head. D. XI–I, 23; A. II, 9; scales 6–46–10. Body rather short and deep, the back elevated, and the profile steep. Mouth moderate, the maxillary reaching to behind pupil, 2½ in head; lower spine of preopercle directed downward and forward; bones of side of head little cavernous; interorbital width more than ⅓ head; mouth low, little oblique, the maxillary reaching to behind pupil, 2½ in head; lower jaw included; teeth of lower jaw subequal, in a narrow villiform band; gill rakers rather short, few; snout short, thick, and blunt, protruding beyond the premaxillaries which are on the level of the eye; highest dorsal spine 1⅗ in head; second anal spine small, 2¼ in head, shorter than soft rays; ventrals 2½ in head; pectorals scarcely shorter than head. Color dull silvery, darker above; lower fins pale. Panama; not rare. (Named for Ignatius Fürth, Austrian cousul at Panama, who sent a valuable collection of fishes to Dr. Steindachner at Vienna.)

Corvina (Homoprion) fürthi, STEINDACHNER, Ichth. Beitr., III, 26, fig. 3, 1875, Panama. (Coll. Ignatius Fürth.)
Sciæna fürthi, JORDAN & GILBERT, Bull. U. S., Fish Comm. 1881, 315.
Stilliferus fürthi, JORDAN & EIGENMANN, *l. c.*, 393, 1889.

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*A closely allied species, with larger mouth, *Stellifer rastrifer*, Jordan, is common on the coast of Brazil, and may be found in Guiana.

Subgenus ZESTIDIUM, Gilbert.

1823. STELLIFER ILLECEBROSUS*, Gilbert.

Head 3; depth $2\frac{9}{10}$; eye $5\frac{1}{7}$ to $5\frac{3}{5}$ in head; snout 4 to $4\frac{1}{4}$. D. XIV, 20 or 21; A. II, 11; pectoral 19 or 20. Body compressed, rather deep, both outlines curved, the dorsal more than the ventral; head broad and depressed, but less so than in the other species of *Stellifer*, the interorbital width equaling distance from tip of snout to front of pupil, $3\frac{3}{5}$ in head; greatest width of head $1\frac{9}{10}$ to $2\frac{1}{10}$ in its length. Upper profile depressed above the orbits, the snout rather bluntly rounded, overlapping the premaxillaries but little; mouth large, moderately oblique, the gape curved; maxillary reaching vertical from middle of pupil, or slightly behind this point, its length, measured from front of premaxillaries, $2\frac{3}{4}$ to $2\frac{5}{6}$ in head. Teeth in lower jaw uniform in size, in a villiform band of moderate width, which does not conspicuously increase toward symphysis; premaxillary teeth in a similar villiform band, with an outer row of enlarged canines, which decrease in size toward the angle of the mouth. Lips thin, but somewhat thicker than in other species of the genus; 5 large pores in mandible, and 5 in snout immediately behind premaxillaries, the inner pair concealed by overhanging lobes. Back of these are three minute pores. Least width of preorbital $\frac{1}{2}$ the diameter of orbit. Vertical limb of preopercle with 8 or 9 rather slender spines, increasing in size toward the angle, usually 3 of those at the angle enlarged and radiating regularly, or the lowermost may be directed abruptly downward; the horizontal limb entire or provided with small flexible spines, loosely attached and projecting but little beyond the integument. Gill rakers short, slender, the longest nearly $\frac{1}{2}$ the longitudinal diameter of eye, 5 or 6 above angle of arch, 10 or 11 below. Spinous dorsal high, the first two spines strong and rigid, the third to the eleventh weak and flexible, the twelfth to the fourteenth again stronger and rigid; second spine nearly $\frac{2}{3}$ the third, which is the longest, $1\frac{7}{8}$ in head; the fin diminishing slowly in height to the sixth spine, then more rapidly to the eleventh, which is the shortest; twelfth to fourteenth progressively lengthen and belonging to the second dorsal, the last being more than $\frac{1}{2}$ the length of the longest ray; second anal spine long and slender, about $\frac{2}{3}$ the height of the longest ray, equaling distance from tip of snout to front of pupil; caudal convex, the lower lobe slightly longer than the upper; pectorals short and broad, $1\frac{2}{3}$ to $1\frac{3}{4}$ in head, the upper angle rounded, not reaching as far back as the ventrals, which equal them in length; axillary scales of ventrals and pectorals very little developed. Color varying from uniform deep bronze purple on body and fins to brownish gray with silvery reflections; lower parts of head and body somewhat lighter; tip of mandible white. Eight specimens, the longest 8 inches, were taken around San Jose Rock, in the Bay of Panama. This species is related most nearly to *Stellifer minor*, in some respects intermediate between *Stellifer* and *Bairdiella*. In this species, 3 slender interneurals not connected with dor-

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***Stellifer minor* (Tschudi), a related species with similar opercular armature, is a common food fish of Peru. It reaches a larger size than any of the others.

sal spines lie in advance of the neural spine of the second vertebra; 4 interneurals giving attachment to dorsal spines lie crowded between the neural spines of the second and third vertebræ, the anterior one being very broad; 3 interneurals follow interposed between the third and fourth neurals, and 3 more between the fourth and fifth. (Gilbert.) (*illecebra*, a spur.)

Stellifer illecebrosus, GILBERT MS., Fishes of Panama, 1898, Panama. (Coll. Gilbert.)

Subgenus STELLIFER.

1824. STELLIFER STELLIFER (Bloch).

Head $3\frac{1}{2}$; depth $3\frac{1}{8}$; eye rather large, $4\frac{1}{3}$ in head; snout very short and blunt, $4\frac{1}{6}$; D. XI–I, 19; A. II, 8; scales 48. Mouth large, oblique, the maxillary 2 to $2\frac{1}{2}$ in length of head; reaching posterior border of eye; snout very short, little projecting; preopercle with 3 or 4 spines next the angle, divergent, considerably larger than the others; lowermost spinule of preopercle not directed downward; pectoral fin long, $1\frac{1}{6}$ in head; body deep, compressed; head short, deep, more compressed than in related species, the interorbital space less depressed, its width $3\frac{1}{5}$ in head, the supraocular ridges less prominent; anterior profile evenly convex; the premaxillary on the level of lower part of eye; preopercle very convex, forming an arc of a circle; gill rakers long and slender, $x+18$, the longest $\frac{2}{3}$ eye; dorsal spines slender, rather low, the longest $1\frac{3}{4}$ in head; second anal spine long and rather stout, $1\frac{2}{3}$ in head; caudal fin pointed. Color dull silvery, the fins not very dark. Coasts of Guiana and Brazil, rather common; the specimens above described from Bahia. (*stellifer*, star-bearing, from the radiated suborbital.)

Bodianus stellifer, BLOCH, Ichthyologia, pl. 231, 1790, Cape of Good Hope.

Corvina trispinosa, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 109, 1830, Brazil; Cayenne; STEINDACHNER, Sciænoiden Brasiliens, 14, 1863.

Sciæna (Stelliferus) stellifera, JORDAN, Proc. U. S. Nat. Mus. 1886, 540 (notes on type of *trispinosa*).

Stelliferus stellifer, JORDAN & EIGENMANN, *l. c.*, 394.

1825. STELLIFER LANCEOLATUS (Holbrook).

Head $3\frac{1}{4}$; depth $3\frac{1}{2}$; eye $4\frac{1}{3}$; snout $4\frac{1}{3}$. D. XI–I, 20 to 23; A. II, 7 or 8; scales 5–47 to 50–8. Interorbital width 3 in head; gill rakers $13+22$, about $\frac{3}{4}$ length of eye; pectoral short, about $1\frac{2}{3}$ in head, about as long as ventral; second anal spine $2\frac{1}{4}$. Body rather slender; mouth moderate, oblique, the maxillary not quite half length of head, extending just past pupil; premaxillary in front on level of lower margin of pupil. Teeth above in broad bands, the outer row enlarged. Scales on head cycloid. Dorsal spines slender, the first two somewhat stronger, the highest about 2 in head; caudal long, lanceolate, $1\frac{1}{5}$ in head; second anal spine little shorter than highest dorsal spine; first ventral ray filiform. Color grayish olive above, silvery below; fins all nearly uniform dusky, the ventrals margined with white; many black dots along the sides; base of anal fin and inner lining of opercle dusky. South Atlantic and Gulf Coast of the United

States, Charleston to Texas; a small fish, rather rare on our coast, and from rather deep water; the specimen here described obtained at Charleston. (*lanceolatus*, lanceolate, from the form of the caudal.)

Homoprion lanceolatus, HOLBROOK, Ichthyol. S. Carolina, Ed. 1, 168, pl. 23, 1856, Port Royal Sound, Beaufort, S. C.; GIRARD, U. S. and Mex. Bound. Survey, 11, 1859.
Sciæna lanceolata, GÜNTHER, Cat., II, 289, 1860; JORDAN & GILBERT, Synopsis, 931, 1883.
Stelliferus lanceolatus, GOODE, Proc. U. S. Nat. Mus. 1881, 113; JORDAN & EIGENMANN, *l. c.*, 394, 1889.
Sciæna stellifera, JORDAN & GILBERT, Synopsis, 569, 1883.

1826. STELLIFER ERICYMBA (Jordan & Gilbert).

Head 3⅓; depth 3⅓; eye 5 in head; snout 5; D. XII–I, 23 or 24; A. II, 7 or 8; scales 5–48–8. Body short and stout, little compressed, the back somewhat elevated, the caudal peduncle slender; profile nearly straight and not steep, from the scarcely truncate snout to the occiput, where an angle is formed, the rise thence to the base of the dorsal being more steep; head very broad, with very cavernous preopercle, preorbital, and cranium; interorbital space broad, flat, its least width equal to snout and ½ of eye, about twice diameter of small eye, 2⅘ in length of head. Snout very short, not projecting beyond premaxillaries; supraocular ridges prominent; a cross ridge on forehead connecting nostrils; mouth terminal, oblique, smaller, and more oblique than in *S. furthi*, its gape 2⅘ in length of head; premaxillaries in front on the level of the lower part of the eye; maxillary reaching to opposite posterior border of pupil; front of premaxillaries extending farther forward than tip of snout. Teeth much as in *S. furthi;* upper jaw with an external series of small, slender teeth, behind which are 2 or 3 rows of smaller teeth; lower jaw with a narrow villiform band; pores of chin obscure; symphyseal knob small. Edge of preopercle with several (about 7) rather strong, slender, radiating teeth, the 3 near the angle largest, none of them directed downward or forward. Gill rakers long and slender, 11 + 18, much more than ½ diameter of eye; pseudobranchiæ small. Suprascapula prominent, with slender teeth. Scales large, rather strongly ctenoid; lateral line very strongly arched, becoming straight just in front of insertion of anal. Vertical fins covered with small scales. Spinous dorsal low, the second spine much stouter than those succeeding, stiff; other spines very slender and flexible; second spine as long as snout and ½ of eye; third spine ⅖ length of head; soft dorsal low, rather lower than the spines. Caudal fin rhombic, the middle rays longest, ¾ length of head; least depth of caudal peduncle ⅖ length of head; anal fin small, not very far back, its last rays well in front of last of dorsal; distance from its first ray to front of caudal 3¼ in total length of fish (to base of caudal); its distance behind the vent about equal to the length of its second spine which is 2¼[*] in head, stout, but shortish, lower than the soft rays; ventrals moderate, not reaching vent, coterminous with the pectorals, which are rather long, ⅘ length of head. Coloration dark brownish above, white below; everywhere with dark points; upper part with bright-bluish reflections; lower parts with silvery luster; a dark temporal blotch; lower jaw black within, behind the front teeth; fins all dark-brownish, the pectoral, anal, and ventrals quite black, with minute dark points; tip of spinous dorsal black; lining of opercle dusky; peritoneum silvery. Bay of Panama, rather common. Types from 6 to 7 inches in length, and as they are evidently mature, this species is probably one of the smallest of the Sciænoid fishes. The cavernous structure of the bones of the head reaches in this species an extreme. (*Ericymba*, a genus of minnows with similar cavernous head; *ἐρί*, very; *κύμβη*, cavity.)

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[*] Misprinted 4 in the original description.

Sciæna ericymba, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 311, Bay of Panama. (Coll. C. H. Gilbert.)
Stelliferus ericymba, JORDAN & EIGENMANN, *l. c.*, 394, 1889.

1827. STELLIFER MICROPS* (Steindachner).

Head $3\frac{1}{5}$; depth $3\frac{1}{2}$; eye 5 to 6; snout 4. D. X–I, 19; A. II, 8; scales 51. Body moderately elongate; snout thick, blunt, convex, and protuberant; head above less cavernous than usual in the genus, more so below; preopercle (as usual in this genus) forming the arc of a circle; mouth rather small, inferior, nearly horizontal; the maxillary 3 in head; premaxillaries entirely below level of eye; lower jaw cavernous; gill rakers about $x + 16$, about $\frac{1}{2}$ diameter of eye; no pores or slits at end of snout; interorbital space $2\frac{2}{3}$ in head; dorsal spines low, the longest $1\frac{2}{3}$ in head; soft dorsal high, the longest ray $2\frac{1}{6}$ in head; second anal spine rather large, $1\frac{2}{3}$ in head; pectoral $1\frac{1}{6}$; teeth on preopercle subequal; preorbital thick and swollen, much broader than eye. Color pale, nearly plain; faint oblique streaks along the rows of scales, those below lateral line running obliquely upward and backward; scales of sides with many brown dots. Length $3\frac{1}{2}$ inches. Coast of Brazil and Guiana. The specimens here described (4581, M. C. Z.) collected at Pará by Dr. Steindachner. (*μικρός* small; *ὤψ*, eye.)

Corvina stellifera, GÜNTHER, Cat., II, 299, 1860, West Indies (not *Bodianus stellifer*, BLOCH).
Corvina microps, STEINDACHNER, Ichth. Not., I, 6, pl. 2, fig. 1, 1864, Guiana.
Stelliferus microps, JORDAN & EIGENMANN, *l. c.*, 395, 1889.

Subgenus STELLICARENS, Gilbert.

1828. STELLIFER ZESTOCARUS, Gilbert.

Head $3\frac{1}{4}$ to $3\frac{1}{6}$; depth $2\frac{6}{7}$ to $2\frac{9}{10}$; eye $3\frac{2}{3}$ to $3\frac{3}{5}$ in head; snout $4\frac{1}{2}$. Pores in lateral line 47 to 50. D. XII, 19; A. II, 10. Body comparatively deep and compressed, with narrow head, large oblique mouth, the greatest width of head $1\frac{3}{4}$ to $1\frac{4}{5}$ in its length. Anterior profile rising in an even convex curve to front of dorsal, depressed very little if at all above the orbits; greatest depth under front of spinous dorsal; length of caudal peduncle measured from base of last anal ray $1\frac{3}{5}$ in head; from last dorsal ray $1\frac{2}{3}$; least depth of caudal peduncle $2\frac{5}{7}$ in head; head extremely soft, the bones cavernous; snout bluntish, not projecting beyond the premaxillaries, its length 4½ in head; lower jaw included, the tip produced into a short but distinct symphyseal knob; mouth large, very oblique, the maxillary (measured from front of snout) equaling length of snout and eye, 2⅕ in head. Teeth in narrow villiform bands in both jaws, widest in sides of premaxillaries; none of the teeth enlarged; lips thin; mental and rostral pores minute; interorbital space transversely convex, 2½ to $2\frac{9}{10}$ in head; supraorbital ridges prominent; preopercle with a wide membranous border which is strengthened near the angle with diverging ribs; a single, rather stiff spine directed backward, immediately above the angle. Gill rakers numerous, long and slender, about 20 on horizontal limb of arch, the longest ½ the diameter of orbit. Eye large, elliptical, the long axis oblique, equaling distance from tip of snout to front of pupil. Fins high, densely scaled, including the spinous dorsal; first and second dorsal spines rather strong and stiff, the third and succeeding spines flexible; third spine longest, 1⅔ in head; the ninth spine is shortest, the tenth and eleventh longer, belonging to the soft dorsal; last 3 spines stronger and rigid; second anal spine long and rather slender, 2⅓ to 2⅖ in length of head; longest anal ray 1⅔ to 1¾ in head; anal basis long, equaling length of snout and eye; caudal double truncate, almost lanceolate, the middle rays much produced, 1¼ or 1⅕ in head; pectorals long, reaching beyond vent, 1⅓ in head; ventrals not nearly reaching vent, 1½ to 1⅔ in head. Scales thin, deciduous, weakly ctenoid; head completely scaled. Color nearly uniform grayish silvery above, bright silvery below; fins slightly dusky; mouth and gill cavities silvery white, a blackish blotch in the region of the pseudobranchiæ. Seven specimens known, all from Panama Bay, the longest about 6 inches long. (Gilbert.) (*ζεστός*, soft-boiled; *καρά*, head.)

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* A related species, *Stellifer naso*, Jordan, having the eye large, and the lower teeth on preorbital enlarged, occurs in Brazil.

Stellifer zestocarus, GILBERT MS., Fishes of Panama, 1898, Panama. (Coll. C. H. Gilbert.)

582. OPHIOSCION, Gill.

Ophioscion, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 164 (*typicus*).
Sigmurus, GILBERT, new subgenus (*vermicularis*).

This genus is composed of small species, nearly all American, allied to *Sciæna* (*Sciæna umbra* L.), but differing in the armature of the preopercle, its bony margin being at all ages armed with strong persistent serræ, the lowermost teeth not directed forward. The caudal fin in this group is never lunate; the soft dorsal and anal are scaly; teeth in bands; gill rakers rather short. (*ὄφις*, snake; *σκίον*, *Sciæna*.)

OPHIOSCION:

- I. Caudal fin convex or double truncate, the middle rays longest; teeth in the lower jaw equal, in a villiform band.
  - *a*. Caudal lanceolate, as long as head in adult; soft dorsal rays 21 to 23.
    - *b*. Anterior profile of head not concave; caudal moderate, shorter than head. D. X–I, 22 or 23; head low, subconic; maxillary 3⅓ in head. Color soiled brassy, with dark streaks along the rows of scales. ADUSTUS, 1829.
    - *bb*. Anterior profile of head more or less concave, especially in old examples; caudal lanceolate, as long as head. Color grayish; the fins largely black.

c. Eye large, 3¾ in head; snout projecting beyond the small mouth, the maxillary 2½ in head; preopercle with numerous spines. D. X–I, 22. TYPICUS, 1830.

cc. Eye small, 4 to 4½ in head; snout little projecting; mouth wider, the maxillary 3⅓ in head, preopercle with 4 to 6 spines. STRABO, 1831.

aa. Caudal fin irregularly double truncate, much shorter than the head; soft dorsal with 24 to 26 rays.

e. Snout much projecting beyond the premaxillaries; head blunt, somewhat spongy; body rather deep, compressed; the back considerably elevated. Color uniform dull brownish without dark streaks.

f. Pectorals 1⅓ in head; maxillary 3⅓ in head; head less depressed, everywhere rounded. SIMULUS, 1832.

ff. Pectorals almost as long as head; maxillary 3 in head; head low and small. IMICEPS, 1833.

ee. Snout scarcely projecting beyond the premaxillaries; head not very slender; body robust; profile steep; back and sides with conspicuous blackish streaks along the rows of scales; maxillary 3 in head; caudal 1⅗ in head; pectorals 1¼; fins dusky. SCIERUS, 1834.

SIGMURUS (*σίγμα*, sigma; *ὀυρά*, tail):

II. Caudal f-shaped, the acute upper angle much produced, longer than median rays. Teeth in lower jaw unequal, a series of larger ones being present besides those of the villiform band; body with distinct dark streaks; fins dusky. Second anal spine strong, 2 in head. D. X–I, 25. VERMICULARIS, 1835.

Subgenus OPHIOSCION.

1829. **OPHIOSCION ADUSTUS** (Agassiz).

Head 3²⁄₇; depth 3⅓. D. XI–I, 22; A. II, 7; scales 51 (pores); eye 3⅔ in head; snout 4½; maxillary 3⅕; preorbital about as broad as eye. Body compressed, of moderate depth, the head low, subconic, acutish, but blunted at tip of snout. Snout rather long, projecting, its usual pores and slits well developed; eye rather small; mouth small, inferior, horizontal, the maxillary reaching to opposite posterior edge of pupil. Lower teeth equal, in a broadish band; upper teeth with the outer row a little enlarged; interorbital width 3⅓ in head. Preopercle with vertical limb and rounded angle with about 8 rather strong teeth. Gill rakers very short, thicker than high. Scales regularly placed, those below lateral line in horizontal series; lateral line becoming straight before anal. Dorsal spines stout, the longest 1⅘ in head; longest soft rays 3; second anal spine short and very stout, 2 in head. Pectoral long, 1⅓ in head. Color soiled brassy, a faint small dark spot on each scale of back and sides, these forming dusky streaks along each row of scales; fins all dark, with dark points, the pectorals, ventrals, and anal darkest. West Indies to coast of Brazil. Here described from No. 22417, M. C. Z., 7 inches long, collected at Pernambuco by Rev. J. C. Fletcher. Two other specimens examined by us, one from Jérémie, Hayti (D. X–I, 23), and another (1031, M. C. Z.) from Fonteboa, Brazil. This specimen, with its co-types from Jérémie and Fonteboa, was referred by Jordan & Eigenmann (Rev. Sciæn., 403, 1889) to *Sciæna adusta*, Agassiz. This determination is apparently correct. It is, however, not the species called *Sciæna adusta* by Eigenmann, Ann. N. Y. Ac. 1894, 631, which is the young of the fresh-water *Lepipterus bonariensis.* Agassiz's figure of *Sciæna adusta* shows 19 or 20 soft dorsal rays. This is apparently an error of the artist, while the description which gives 28 soft dorsal rays is a slip or misprint of the author. Dr. Carlos Berg (Ann. Mus. Nac. Buenos Aires 1895, 53) observes: "The number of rays of the vertical fins is somewhat variable, as is also the intensity of the oblique dusky streaks. I observe the following formula: D. X–I, 23 to X–I, 26; A. II, 7 or 8. Scales 51 to 60." (*adustus,* scorched brown.)

Sciæna (Corvina) adusta, AGASSIZ, Spix. Brasil., 126, pl. 70, 1829, Montevideo.
Sciæna adusta, JORDAN & EIGENMANN, Review Sciænidæ, 403, 1889; BERG, Ann. Mus. Nac. Buenos Aires 1895, 53.

1830. OPHIOSCION TYPICUS, Gill.

Head $3\frac{1}{3}$; depth $3\frac{1}{3}$; eye $3\frac{3}{4}$ in head; snout $3\frac{3}{4}$. D. X–I, 22; A. II. 7; scales 5–50–7. Anterior profile more or less concave, especially in old examples, the head being very low and slender; caudal fin lanceolate, almost as long as head; snout short and bluntish, projecting a little beyond the premaxillaries, about as long as eye; mouth small, low, maxillary extending to below middle of eye, $2\frac{1}{2}$ in head; teeth in both jaws in moderate bands, the outer series of the upper jaw enlarged; highest dorsal spine $1\frac{4}{5}$ in head; anal spine very thick, strong, as long as the rays, $1\frac{3}{4}$ in head; pectorals about as long as ventrals; first ventral ray filiform. Color, grayish; anal and ventral fins largely black. Panama, not uncommon. In its slender head and lanceolate caudal fin it would seem to differ widely from most of the related forms. Its relations with *O. scierus* are, however, close, and *O. imiceps* is evidently intermediate. (*typicus,* typical.)

Ophioscion typicus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 165, west coast Central America.
Corvina ophioscion, GÜNTHER, Fish. Central America, 387 and 428, 1866, Panama.
Sciæna ophioscion, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 315.
*Sciæna typica**, JORDAN & EIGENMANN, *l. c.*, 404, 1889.

1831. OPHIOSCION STRABO, Gilbert.

Head $3\frac{2}{5}$; depth $3\frac{1}{3}$. D. X–I, 22 or 23; A. II, 6; eye 4 to $4\frac{1}{2}$ in head; snout $3\frac{1}{2}$; maxillary $3\frac{1}{6}$ to $3\frac{2}{5}$; highest dorsal spine $1\frac{2}{3}$ to $1\frac{3}{4}$; dorsal ray $2\frac{1}{6}$; anal ray $1\frac{1}{2}$; caudal $3\frac{2}{5}$ in length; pectorals $4\frac{2}{3}$; ventrals 5; scales 5 or 6–49–10. Closely allied to *O. typicus,* having the same general shape and the elongated caudal, which is longer than head. It differs conspicuously in its much smaller eye, its heavier, shorter snout, which barely protrudes beyond the mouth, and its longer, less numerous, preopercular spines. Snout bluntly rounded, little projecting, the mouth short and broad compared with *O. typicus.* Anterior upper profile very concave, rising rapidly from occiput to dorsal, growing sharply compressed. Mouth moderately oblique, subterminal, the snout protruding beyond the premaxillaries for a distance (measured axially) equaling $\frac{1}{2}$ diameter of pupil; maxillary reaching slightly behind front of orbit. Mandibular teeth of equal size, in a wide villiform band; premaxillary band similar, preceded by an outer row of short slender canines; preorbital rather narrow, half interorbital width; eyes small, obliquely set; interorbital space transversely convex, its width 3⅗ in head; a low superciliary ridge; preopercular margin with a few (4 to 6) slender needle-like spines, the 3 longer ones wide spaced, evenly radiating about the angle; margin of lower limb furnished with 5 or 6 minute spinous teeth, compressed, triangular, and flexible; gill rakers short, slender, and about ½ diameter of pupil, 6 or 7 above angle, 12 below; first 2 and last 2 dorsal spines rather strong and rigid, the others exceedingly slender and flexible; third spine the longest, reaching beyond base of tenth spine when depressed, 1⅝ to 1¾ in length of head; tenth spine shortest, the eleventh longer, representing the first ray of second dorsal; distance from last dorsal ray to base of middle caudal ray equals length of snout and ½ of eye; second anal spine long and slender, ½ or slightly more than ½ length of head, ¾ or ⅘ the longest anal ray; anal basis but little more oblique than the rest of the abdominal profile; distance from base of last anal ray to base of middle caudal ray slightly exceeds distance from tip of snout to preopercular margin; caudal lanceolate, the middle rays much produced, equaling distance from tip of snout to axil of pectorals; pectorals short, scarcely reaching tips of ventrals, the latter not to vent; outer ventral ray slightly produced beyond the rest. Scales smaller than in *O. typicus*, 5 or 6 in the vertical series between lateral line and back; arch of lateral line ending over the anterior portion of anal fin; head almost entirely scaled, including mandible, branchiostegal rays, preorbital, and top of head forward to near extreme tip of snout; on snout, preorbital, and mandibles, the scales are cycloid. Color in spirits, nearly uniform light brown, lighter below and with some silvery luster; fins all dusky, the anal and ventrals black, the outer ventral ray white; opercular lining dusky. Six specimens, the longest 5 inches long, from San Juan Lagoon, south of Guaymas, Mexico. (Gilbert.) (*strabo*, a blinkard, from the small oblique eyes.)

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* The undesirability of such words as "*typicus*" as specific names is very evident in this case. In following the law of priority in referring the species to *Sciæna*, the species has possessed a name which is self-contradictory, as this is one of the species most unlike the real type of *Sciæna.* If *Ophioscion* is recognized, this solecism is not evident.

Ophioscion strabo, GILBERT, Proc. U. S. Nat. Mus. 1896 (1897), 444, San Juan Lagoon, south of Guaymas, Mexico. (Type, No. 47742, U. S. N. M. Coll. C. H. Gilbert.)

1832. OPHIOSCION SIMULUS, Gilbert.

Head 3⅗; depth 3⅗; eye 4⅖ in head. D. XI, 26; A. II, 7; P. 18 or 19; pores in lateral line 50; and smaller scales covering base of caudal fin. Body more elongate and less compressed than in other species, the head especially characterized by rounded outlines; preorbitals turgid; snout blunt, scarcely at all compressed, evenly rounded in all directions; top of head everywhere transversely convex, not at all depressed over the orbits; a scarcely noticeable depression at occiput, with the exception of which the profile rises slowly and evenly to the front of the dorsal fin; predorsal region transversely evenly convex, not compressed to a ridge except immediately in front of first dorsal spine; dorsal and ventral outlines about equally curved, the base of anal fin but little more oblique than the normal contour at that point. Mouth wide, broadly U-shaped as seen from below, overpassed by the bluntly rounded snout for a distance (taken axially) equal to ½ diameter of pupil; cleft of the mouth moderately oblique, the maxillary reaching vertical from middle of pupil; length of maxillary (measured from front of premaxillaries) 3⅓ in head; mandible with a broad band of villiform teeth of uniform size; premaxillaries with a similar broad villiform band, preceded by an outer series of small canines, close-set, smaller in size than in related species; preorbital of moderate width, swollen and turgid as in *Pachyurus*, its width 6⅓ in head; posterior nostril large, circular, without trace of raised membranous edge; anterior nostril vertically elliptical, small, and with raised margin; preopercular margin with 14 to 16 spinous teeth (in the type specimen), the upper ones minute, increasing in size toward preopercular angle, around which they evenly radiate, none conspicuously enlarged, and the lowermost not directed abruptly downward. Gill rakers short, the longest about equaling diameter of posterior nostril, 7 movable ones on upper limb of arch, 13 below. First dorsal high, of very slender flexible spines, except the first two; second spine strong and rigid, as long as the fourth, contained 1¾ times in the head; third spine the longest, reaching when declined to base of first ray of second dorsal, its length 1⅗ in head; from the third, the spines decrease rapidly, so that the distal margin of the fin is subvertical; the tenth spine shortest, its membrane reaching base only of the eleventh, which belongs to second dorsal and is ⅔ diameter of the eye; second dorsal high, the longest ray equaling length of snout and eye; caudal sublanceolate, mutilated so that its exact shape can not be ascertained; middle rays considerably longer than the outer, and at least ¾ length of head; second anal spine long and strong, its length 1⅔ in head, slightly greater than that of first soft ray which, however, projects beyond it; outer ventral ray produced in a very short filament, about ¼ diameter of eye; ventral spine 2⅗ in head, the longest ray, exclusive of filament, 1½ in head, reaching 5/7 distance from their base to vent; pectorals 1⅓ in head, reaching a vertical from tips of ventrals. Lips, branchiostegals, gular membranes, and under side of snout naked, head and body otherwise scaled; scales on mandible and those in advance of nostrils cycloid or those on top of snout very weakly ctenoid, scales otherwise strongly ctenoid; second dorsal and anal with a definite low scaly sheath at base consisting of a single series of small scales, and, in addition, series of scales on the membranes extending ⅔ distance to tip. Caudal scaled to tip; lateral line with a long low curve, the height of which equals ½ diameter of orbit. Color steel gray above, without dark streaks, white below, the cheeks and lower portion of sides with much brown specking, sometimes confined to the margins of the scales; mouth white within; lining of opercles blackish; fins dusky, the distal part of ventrals black, the outer ray white; anal with the anterior rays tipped with black. A single specimen, about 8 inches long. Panama. This species is closely related to *O. scierus*, but differs in the longer, less compressed body, the plain coloration, the turgid preorbitals, less arched lateral line, and smaller teeth. (Gilbert.) (A diminutive of *simus*, snub-nosed.)

Ophioscion simulus, GILBERT MS., Fishes of Panama 1898, Panama (Coll. C. H. Gilbert.)

1833. OPHIOSCION IMICEPS (Jordan & Gilbert).

Head 3⅔; depth 3. D. XI–I, 25; A. II, 8; scales 5–51–9; eye longer than snout, 4⅓ in head. Body deep and compressed, the back considerably elevated, the caudal peduncle short and deep; head very small, narrow, and low; the snout bluntly pointed, the profile from the nostrils to the interorbital region not steep, thence rising steeply with a considerable curve to the base of the dorsal; depth of the head at the middle of the eye equal to the length of the snout and eye, and about equal to the greatest thickness of the head; interorbital space narrow, little convex, little wider than eye, 4 in head, about equal to length of snout; preorbital wide, gibbous; preopercle somewhat cavernous; mouth small, inferior, horizontal, the lower jaw much overlapped by the snout, its tip extending little forward of the nostrils; maxillary extending to opposite middle of eye; premaxillary in front, far below level of lower edge of eye; length of gape 3⅔ in head; teeth very small, in narrow villiform bands in both jaws, the outer row in the upper jaw enlarged. Preopercle armed with strong radiating teeth, about 3 near the angle larger than the others, none of them directed downward. Chin with 2 large pores, preceded by 2 smaller ones, and without symphyseal knob. Pseudobranchiæ small. Gill rakers (as in *Ophioscion typicus*) minute, slender, not longer than nostril. Scales roughish; lateral line strongly curved, becoming straight opposite middle of anal fin. Spinous dorsal rather high, the spines not very slender, the second spine a little stronger than the others, 2⅓ in head, the highest spine 1¾ in head, considerably higher than the soft rays; soft dorsal and anal fins scaled a little more than halfway up. Caudal double truncate, the middle rays moderately produced, the upper angle acute, the lower rounded; middle rays of caudal 1⅖ in head; anal inserted nearly under the middle of the soft dorsal, the distance from the first ray to base of caudal 3⅙ in length of body; second anal spine shortish, but rather strong, somewhat shorter than the first soft ray, its length considerably greater than its distance from the vent and equal to ½ the length of the head; ventrals small, reaching about halfway to anal, not to tip of pectorals, which are long, scarcely shorter than head. Color dull brown above; belly white, but not silvery; upper fins brown, the spinous dorsal dusky at tip; anal dusky, thickly studded with dark points; ventrals and pectorals dusky; a faint band of dark points from base of pectoral straight to caudal, bounding the dark color of the upper parts; peritoneum white; lining of opercles partly black. Three specimens of this species, each 6¾ inches in length, were taken in the Bay of Panama. It resembles the species of *Stellifer*, and it has real affinities with that group. The head is, however, different, being low and narrow, and little cavernous, while the gill rakers are very short, as in the other species referred to *Ophioscion*. (*imus*, lowest; *ceps*, head.)

Sciæna imiceps, Jordan & Gilbert, Bull. U. S. Fish Comm. 1881, 309. Bay of Panama (Types, Nos. 29432, 29481, 29489. Coll. C. H. Gilbert); Jordan & Eigenmann, *l. c.*, 404.

1834. OPHIOSCION SCIERUS (Jordan & Gilbert).

Head $3\frac{3}{5}$ (4 in total); depth 3 to $3\frac{1}{3}$; eye $5\frac{1}{2}$ in head. D. X–I, 24; A. II 7; scales 6–50 to 55–12. Body oblong, the caudal peduncle slender, the back moderately elevated; snout rather acute, projecting moderately beyond the premaxillaries, its length $3\frac{5}{6}$ in head; anterior profile slightly concave above eye, thence from nape to dorsal steep and rather strongly convex; mouth of moderate size, little oblique, subinferior, the maxillary extending to rather beyond the posterior margin of pupil, its length $3\frac{1}{5}$ in head. Teeth in the lower jaw in a rather broad villiform band, the outer teeth not enlarged, similar to the inner teeth; outer teeth of upper jaw moderately enlarged. Interorbital space rather narrow, gently convex, its width $5\frac{1}{3}$ in head. Cranium not spongy to the touch; preopercle rather coarsely serrate, the teeth near the angle largest, none of them directed forward. Gill rakers thickish, extremely short and small, the longest not longer than nostril. Scales rather small, the soft dorsal and anal well scaled. Dorsal spines rather slender and low, the second much stouter than the third, which is longest, 2 in head; longest soft ray of dorsal $2\frac{3}{5}$ in head; caudal fin irregularly double truncate, the median rays longest, $1\frac{3}{5}$ in head, the upper angle not produced; longest soft rays of anal about $\frac{1}{2}$ head; second anal spine robust, rather long, $1\frac{5}{6}$ in head; pectorals reaching past tips of ventrals, $1\frac{1}{5}$ in head; ventrals $1\frac{3}{4}$. Color steel gray above, dull silvery below, everywhere much soiled with dark brown points; center of each scale dark brown; these dark spots confluent in narrow but distinct dark stripes, which follow the direction of the rows of scales; streaks above lateral line anteriorly running obliquely upward and backward; below lateral line horizontal posteriorly and somewhat undulating; fins plain; the edge of the spinous dorsal and the whole of the anal and ventrals blackish; other fins paler. Pacific coast of tropical America from Mazatlan to Panama; one of the most abundant of the Sciænoid fishes on the west coast of Mexico. Here described from No. 29490, 9 inches long, from Panama. (σκιερός, dusky.)

Sciæna vermicularis, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1881, 315 (not *Corvina vermicularis*, GÜNTHER).

Sciæna sciera, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 480, Mazatlan; Panama (Types, Nos. 28385, 29229, 29269, 29275, 29337, 29638, 29490, 29499. Coll. C. H. Gilbert); JORDAN & EIGENMANN, *l. c.*, 404, 1889.

Subgenus SIGMURUS, Gilbert.

1835. OPHIOSCION VERMICULARIS (Günther).

Head $3\frac{1}{6}$; depth 3. D. X-I, 27; A. II, 8; orbit 5 in head; snout $3\frac{2}{3}$; maxillary 3; highest dorsal spine $1\frac{5}{6}$; dorsal ray 4; second anal spine $2\frac{1}{6}$; length of caudal fin $1\frac{2}{3}$; ventrals $1\frac{2}{5}$; pectorals $1\frac{1}{3}$. Body robust, deep; the back considerably elevated; ventral outline rounded. Head somewhat compressed; profile steep, a little concave over the head; mouth oblique; premaxillaries below level of the eye; maxillary reaching to the vertical from middle of pupil; lower jaw included; teeth on jaws unequal, an outside series of larger ones being present, besides those of the villiform band; snout obtuse, longer than the eye, projecting a little beyond the premaxillaries; slits and pores on snout large; anterior nostril with a dermal flap; interorbital space about 4 in head; preorbital broad, about 7 in head; preopercle with wide-set spinous teeth on posterior margin; gill rakers 6 + 11, short, some of them rudimentary; pseudobranchiæ well developed. Dorsal spines not very strong, the third longest, reaching, when depressed, beyond tip of the eighth; soft dorsal lower than spinous, the fin with a scaly sheath at its base, its membranes covered with small scales; base of anal 3 in head, the third spine very strong, not reaching tip of the longest rays; upper lobe of caudal produced, acute, the lower lobe rounded; ventrals filiform at tip, almost the same length as pectorals. Lateral line arched anteriorly, becoming straight over middle of the base of anal fin; about 59 scales in the lateral line; 6 scales in the vertical series between lateral line and back, 15 in the vertical series below lateral line. Panama; known from the original type and from five specimens lately taken by Dr. Gilbert, from which the present description is taken. (*vermicularis*, marked with worm-tracks.)

Corvina vermicularis, GÜNTHER, Fish. Central America, 387 and 427, pl. 67, fig. 2, 1869, Panama. (Coll. Capt. Dow.)

Sciæna vermicularis, JORDAN, Proc. U. S. Nat. Mus. 1885, 381; JORDAN & EIGENMANN, *l. c.*, 404, 1889.

583. SCIÆNOPS, Gill.

(RED DRUMS.)

Sciænops, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 30 (*ocellata*).

This genus is close to *Ophioscion*, from which it differs in the loss of its preopercular armature with age, the serrate edge of the bone becoming entire. The caudal fin is truncate or concave, the soft dorsal scaleless; the slits and pores of the upper jaw are well developed and the single species reaches a very large size. The group is not well separated from *Ophioscion* on the one hand, or from *Sciæna* on the other, but its retention seems to be convenient. (*σκιαίνα*, *Sciæna*, the ancient name of the European species *Sciæna umbra* and *Pseudosciæna aquila*, from *σκιά*, shade; *ὤψ*, appearence.)

1836. SCIÆNOPS OCELLATUS (Linnæus).

(RED DRUM; CHANNEL BASS; "RED-FISH;" PESCADO COLORADO; BULL RED-FISH.)

Head 3⅓; depth 3½; eye 7 in head; snout 4. D. X–I, 24; A. II, 8; scales 4–45 to 50–12. Body elongate, rather robust, not much compressed; back somewhat arched; profile rather steep, somewhat convex; head long, rather low; eye small; snout bluntish, rather long. Preopercle with its bony margin sharply serrate in young examples, becoming entire with age, the serræ entirely disappearing in specimens of 20 to 30 pounds weight; in these the even edge of the bone is wholly covered by skin; mouth large, nearly horizontal; maxillary not quite reaching posterior border of orbit, 2½ in head; teeth in both jaws in villiform bands, the outer series of the upper jaw much enlarged; lower teeth subequal; gill rakers 5 + 7, shorter than the diameter of the pupil; longest dorsal spine 2⅓ in head; second anal spine 1⅖ in the longest ray, 3⅖ in head; pectorals as long as ventrals, 2 in head; scales of the breast embedded, cycloid; soft dorsal scaleless; caudal fin slightly concave, about ½ as long as head. Color grayish silvery, iridescent; often washed with coppery red; each scale with a center of dark points, these forming rather obscure, irregular, undulating brown stripes along the rows of scales; a jet-black ocellated spot about as large as eye at base of caudal above, this sometimes duplicated; the body occasionally covered with ocelli. Length 2 to 5 feet; the weight 10 to 75 pounds. South Atlantic and Gulf coasts of the United States, New York to Texas; very common along our coast, especially southward, where it is one of the largest and most important food-fishes. On the Texas coast it exceeds in economic value all other fishes found there. (*ocellatus*, having eye-like spots.)

Perca ocellata, LINNÆUS, Syst. Nat., Ed. XII, 483, 1766, South Carolina.

Lutjanus triangulum, LACÉPÈDE, Hist. Nat. Poiss., IV, 181 and 216, pl. 24, fig. 3, 1802, Sumatra.

Sciœna imberbis, MITCHILL, Trans. Lit. & Phil. Soc. New York 1815, 411, New York.

Corvina ocellata, CUVIER & VALENCIENNES, Hist. Nat. Poiss., 134, pl. 108, 1830.

Johnius ocellatus, GIRARD, U. S. & Mex. Bound. Survey, 14, pl. 8, figs. 1–4, 1859.

Sciœna ocellata, GÜNTHER, Cat., II, 289, 1860; JORDAN & EIGENMANN, *l. c.*, 405, pl. 4, 1889.

584. SCIÆNA[*] (Artedi) Linnæus.

(BLACK DRUMS.)

Sciœna, part, ARTEDI, Genera Piscium 1738.

Sciœna, LINNÆUS, Systema Naturæ, Ed. X, 289, 1758 (*umbra; cirrosa*).

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[*] It is very difficult to draw generic distinctions in this part of the group of *Sciœnidœ* It is likewise unsatisfactory not to attempt to draw them, as large groups scarcely admit of definition. We have decided to admit provisionally as genera the minor groups of *Sciœnidœ* with long gill rakers, allied to *Stellifer* and *Bairdiella*. Among those with short gill rakers, we have chosen to recognize *Ophioscion*, *Sciœnops*, and *Pseudosciœna*, referring the rest to one genus *Sciœna*, a heterogeneous group which runs close to *Ophioscion* on the one hand, and diverges far from it on the other. Jordan and Eigenmann observe: We are compelled to place in a single genus the great bulk of those *Sciœnidœ* which have short gill rakers, inferior mouth, and no barbels on the lower jaw. In spite of the marked differences between the extremes of the series, the intergradation in characters is so perfect that we are unable to draw any sharp distinctive lines among them. This is especially true when the Asiatic species, forming the groups called *Bola* and *Johnius*, are taken into account. It is also true that one of the species of *Bairdiella* (*chrysoleuca*) is very close to some of the members of the present group. In this case, however, there is really one difference—the length of the gill rakers, which, though small, is constant, and holds good in all the known species.

With a view to the discovery of a basis for generic subdivision, we have especially compared the following species: *Sciœna* (*Sciœnops*) *ocellata*, *Sciœna* (*Pseudosciœna*) *aquila*, *Sciœna* (*Bola*) *diacantha*, and *Sciœna* (*Callaus*) *deliciosa*. If these species could be satisfactorily arranged in different genera, it would be comparatively easy to find characters on which to detach the rather more aberrant types of *Sciœna* (*umbra*), *Cheilotrema* (*saturna* and *fasciata*), *Ophioscion*, and *Johnius*.

The 4 species first mentioned agree in the position of the anal fin. Its second spine is very weak in *aquila*, and adnate to the first ray. It is somewhat so in the others, and it is not large in any. In *Johnius* (*dussumieri*) it is also small, but in *Sciœna*, *Cheilotrema*, and *Ophioscion* it is considerably enlarged.

The scales are smallest in *aquila*, largest in *ocellata*, but the difference is not sharp enough to warrant generic division. In all 4 of the species first mentioned the preorbital is flat and rather broad, broadest in *deliciosa* (7 in head) and narrowest in *aquila* (10⅓). In the other forms it is generally still broader and more gibbous.

The slits and pores about the snout are distinct in *ocellata* and *deliciosa*, little marked in *diacantha* and nearly or quite obsolete in *aquila*. In *Johnius*, *Sciœna*, *Cheilotrema* and *Ophioscion* these are more or less distinct.

In all the 4 species the mouth is of moderate size, slightly oblique, with the lower jaw included, the maxillary reaching to opposite the posterior border of the eye. The mouth is largest in *ocellata*, smallest in *aquila*. In all the others (*Ophioscion*, etc.) the mouth is

Johnius,* Bloch, Ichthyologia, x, 107, 1793 (*carutta*, etc., restricted by Dr. Gill to *carutta*.)

Sciæna, Cuvier, Règne Animal, Ed. i, 297, 1817 (restricted to *Sciæna umbra*, a Linnæan species, and to *Sciæna aquila*, a non-Linnæan one) (not of Règne Animal, Ed. ii, which is *Pseudosciæna*, Bloch; type, *aquila*).

Bola, Francis Hamilton, Fishes of the Ganges 1822 (*coitor*, etc.).

Corvina, Cuvier, Règne Animal, Ed. ii, Vol. 2, 1829 (*nigra*=*umbra*).

Cheilotrema, Tschudi, Fauna Peruana, Fische, 13, 1845 (*fasciatum*).

Rhinoscion, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 85 (*saturnus*).

Callaus, Jordan, Review Sciænidæ, 395, 1889 (*deliciosus*).

Body oblong, the back more or less elevated and compressed; mouth low, rather small; the snout with conspicuous slits and pores, the lower jaw included; teeth in bands in both jaws, the outer enlarged above; preopercle with a crenulate membranaceous edge, but without bony serræ in young or old; gill rakers short and thick, rather few; lower pharyngeals moderate, separate, with bluntish teeth; soft dorsal long, anal short; caudal fin various; second anal spine various. Species very numerous, varying greatly among themselves, mostly belonging to the Old World. (*Sciæna*, the ancient name of *Sciæna umbra;* from σκιά, shade.)

Callaus (Callao, Peru):

a. Second anal spine small and slender, $4\frac{1}{5}$ in head; body compressed; teeth of lower jaw unequal; gill rakers slender; dorsal and anal scaled at base only; depth 3. D. X-I, 23. Color silvery. deliciosa, 1837.

aa. Second anal spine long and stout, 2 to 3 in head; back elevated; mouth small. Color dusky.

Cheilotrema (χεῖλος, lip; τρῆμα, pore):

b. Vertical fins low, the membranes of dorsal and anal closely scaled; caudal fin lunate, the upper lobe the longer.

  c. Dorsal rays X-I, 27 or 28; snout moderately blunt. saturna, 1838.

Subgenus CALLAUS, Jordan.

1837. SCIÆNA DELICIOSA (Tschudi).

Head 3; depth $3\frac{1}{10}$; eye $5\frac{1}{2}$ in head; snout $4\frac{1}{5}$. D. X-I, 23; A. II, 9; scales 50. Head and body compressed, the back arched, the outline oblong-elliptical; profile straightish, rather steep; snout bluntish; eye rather large, as wide as the broad preorbital; slits and pores on snout anteriorly well

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still smaller. The upper teeth are nearly alike in all of these; of the 4 mentioned they are largest in *diacantha*, smallest in *deliciosa*. In some East Indian species (referable to *Bola?*) these teeth are still larger, some of them almost canine-like.

The lower teeth are rather large, and chiefly uniserial in *diacantha* and other species of *Bola*, in 2 or 3 rows, the inner enlarged in *deliciosa* and *aquila*; in a broad band, some of the inner enlarged in *ocellata*. In *Johnius*, *Cheilotrema*, *Sciæna*, and most of the species of *Ophioscion*, the lower teeth are in a broad band and equal.

The preopercle is sharply serrate in youth, becoming entire with age in *ocellata*. In *aquila* it is vaguely crenulate in youth, becoming finally entire. In *diacantha* it remains more or less crenulate. In *deliciosa* the preopercle is edged by fine flexible serræ. In *Ophioscion* the preopercle is always sharply serrate. In *Sciæna*, *Cheilotrema*, and *Johnius* it is always entire, or at least without bony serratures.

Among the 4 species first mentioned, the gill rakers are smallest in *diacantha* ($X + 7$), when they are short and thick, the longest not $\frac{1}{2}$ the pupil. They are longest in *deliciosa;* when they are slender ($x + 12$), as long as pupil. In *aquila* and *ocellata* they are $X + 8$ or 9, rather slender and short, about $\frac{2}{3}$ length of pupil. In most of the species of the other groups (*Ophioscion*, etc.) they are very few, short and thickish, usually not more than $\frac{1}{2}$ the length of the pupil. The form of the body offers nothing which can be used for generic distinction, as the intergradations are very perfect. The same can be said of the form and the squamation of the fins.

In the present paper we have withdrawn *Ophioscion*, *Sciænops*, and *Pseudosciæna*, referring the other forms to *Sciæna*.

* Named for John, an early missionary in Tranquebar.

developed; maxillary extending to middle of pupil, 3⅙ in head; mouth rather large, a little oblique, the lower jaw slightly included; preopercle finely and evenly serrate, the serræ flexible and not bony; gill rakers slender and very short, scarcely as long as pupil, $x + 12$ in number; teeth in moderate bands, some of the outer moderately enlarged above, some of the inner ones below, these smaller than those of the upper jaw; soft dorsal and anal scaled at base only; dorsal spines moderate; second anal spine small, 4⅕ in head. Caudal lunate, its upper lobe the longer; pectoral long, 1⅙ in head; color bluish above with faint dark horizontal streaks, following the rows of scales; axil dark; fins pale. Pacific coast of South America, from Panama to Peru. Said to be one of the most abundant food-fishes on the coast of Peru. Most of the specimens examined are from Callao, but a few from Panama. (*deliciosus*, delicious.)

Corvina deliciosa, TSCHUDI, Fauna Peruana Ichth., 8, 1845, Peru.
Sciæna deliciosa, GÜNTHER, Cat., II, 295, 1860; JORDAN & EIGENMANN, *l. c.*, 406, 1889.

Subgenus CHEILOTREMA, Tschudi.

1838. SCIÆNA SATURNA* (Girard).

(RED RONCADOR; BLACK CROAKER.)

Head 3⅖; depth 2⅞; eye 4 to 5 in head. D. X-I, 27; A. II, 7; scales 10-55 to 60-17. Vertical fins low, much lower than in *Sciæna umbra*, the membranes of the dorsal and anal closely scaled; caudal fin lunate, the upper lobe the longer; snout moderately blunt, much less obtuse than the related Peruvian species *Sciæna fasciata*, 3½ in head; body oblong, the back considerably elevated; profile steep, the nape convex; preorbital broad, nearly as wide as eye; teeth as in *Sciæna umbra*, the bands broader; pharyngeal teeth all conic, the inner series more or less enlarged; gill rakers short, thick, $6 + 9$; dorsal spines gradually shortened behind the third, which is 2 to 2⅓ in head; ventrals short, 1⅓ in head; middle rays of soft dorsal longest, 2⅔ in head; second anal spine long and stout, 2 to 2⅓ in head, not quite reaching to tip of last ray; first anal rays scarcely elongate, about 2 in head; pectorals broad, 1⅓ to 1½ in head; all scales of head strongly ctenoid; a scaly sheath at base of anal and soft dorsal; caudal slightly convex, its middle rays longest. Color blackish, with coppery luster, each scale with a cluster of dark points; an obscure, broad, pale cross band extending downward from front of soft dorsal to tips of ventrals, this often fading with age; fins rather dark, belly silvery, dusted with dark specks; suborbital region coppery, with round, dark dots; membrane about angle of opercle jet black; tips of ventral and anal black. Coast of Southern California, from Santa Barbara to Cerros Island. A food-fish of some importance, reaching a length of 15 inches. (*saturnus*, dusky, saturnine.)

Amblodon saturnus, GIRARD, U. S. Pac. R. R. Survey, x, 98, 1858, San Diego, California. (Coll. A. Cassidy.)

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* Allied to this species is *Sciæna fasciata* (Tschudi), a large species of the coast of Peru, with a very heavy head. The European *Sciæna umbra*, Linnæus, is also closely related, the vertical fins much higher.

*Corvina (Johnius)** *jacobi*, STEINDACHNER, Ichth. Beitr., VIII, 3, 1879, San Diego (based on young specimens).
Corvina saturna, GÜNTHER, Cat. Fish., II, 288, 1860.
Rhinoscion saturnus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 17.
Sciæna saturna, JORDAN & GILBERT, Synopsis, 572, 1883; JORDAN & EIGENMANN, *l. c.*, 406.
Sciæna jacobi, JORDAN & GILBERT, Synopsis, 571, 1883.

585. RONCADOR, Jordan & Gilbert.

Roncador, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 28 (*stearnsi*).

This genus contains a single species, a large Sciænoid of the California coast, much resembling *Aplodinotus grunniens* and having similar teeth, except that the lower pharyngeals are separate. (*roncador*, grunter, the Spanish name, one of general application to these fishes, but on the California coast used most particularly for the present genus.)

1839. RONCADOR STEARNSI (Steindachner).

(RONCADOR.)

Head 3½ to 3⅔; depth 3 to 3⅓; eye 6 in head; snout 3½. D. X-I, 24; A. II, 8; scales 7-60-12. Body oblong, heavy forward; the back elevated and compressed; profile long, steep, and convex, abruptly rounded at the snout; snout very blunt, about equal to the interorbital space; mouth moderate, low, subinferior, the lower jaw included; maxillary 2⅘ in head, reaching at least to below middle of eye; preorbital nearly as broad as eye; teeth in both jaws in broad villiform bands, none of them enlarged; lower pharyngeals large, with many rounded molars, the outer series and a patch at the outer corner, composed of villiform teeth; gill rakers slender, rather short, 10+16; posterior margin of preopercle with short, stout teeth; dorsal spines strong, the longest 2 in head; caudal lunate, the upper lobe the longer; second anal spine stout, 3½ in head; pectorals much longer than ventrals, about as long as head; scales below lateral line in slightly oblique series. Color grayish silvery, with bluish luster, some streaks of dark points along the rows of scales; breast and belly with two dusky longitudinal streaks; a very conspicuous jet-black spot as large as eye at base of pectoral; axil and lining of gill cavity black.

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* The nominal species, called *Corvina jacobi*, described from young specimens taken at San Diego, is doubtless identical with *Corvina saturna*. The only difference indicated by Steindachner which could have any serious importance is in the coloration. In the species of *Hæmulon*, *Anisotremus*, and other analogous groups the young often have exactly the coloration assigned to *Corvina jacobi*, while the adult may be very differently marked. We have not seen the very young of *saturna*, but have no doubt that it passes through the "*jacobi*" coloration in the course of its development.

The following is the substance of Dr. Steindachner's description:

Head 3; depth 3. D. X-I, 27; A. II, 8; scales 11-56-16. Body moderately elevated; mouth moderate, rather inferior; maxillary reaching middle of eye; outer rows of teeth in each jaw slender, somewhat enlarged, those in the upper jaw much larger than in lower; preopercle finely serrate. Dorsal spines very slender, the fourth ½ length of head, higher than the soft rays; second anal spine more than twice as strong as dorsal spines, as long as from middle of eye to edge of opercle, lower than the soft rays. Caudal truncate or slightly concave; pectorals shorter than ventrals, the first ray of the latter being filamentous. Scales on body and head ctenoid. Silvery gray, darker above; 3 dark brown longitudinal stripes along sides, the lower broadest, extending from eye to middle of caudal, the middle one running to upper edge of tail, the upper to soft dorsal; below these stripes are sometimes feebler ones, besides brownish lines following the rows of scales; fins plain, more or less punctulate; markings probably less distinct in the adult.

Coast of southern California, north to Santa Barbara, generally common; a food-fish of some importance, reaching a weight of 5 or 6 pounds. The black ocellus on the base of the pectoral fin in this species is as characteristic as that at the base of the caudal in *Sciænops ocellatus.* (Named* for Robert E. C. Stearns, the well-known conchologist, then of San Francisco.)

Corvina stearnsi, STEINDACHNER, Ichth. Beitr., III, 22, 1875, San Diego.
Roncador stearnsi, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 28; JORDAN & GILBERT, Synopsis, 572, 1883; JORDAN & EIGENMANN, *l. c.*, 408, pl. 5, 1889.

586. LEIOSTOMUS, Lacépède.

(GOODIES.)

Leiostomus, LACÉPÈDE, Hist. Nat. Poiss., IV, 439, 1802 (*xanthurus*).
Liostomus, GILL, Proc. Ac. Nat. Sci. 1863, 63 (corrected orthography).

Body oblong, ovate, the back compressed; head obtuse; mouth small, horizontal, the upper jaw with a band of feeble teeth, the lower nearly or quite toothless; slits and pores of upper jaw well developed; lower pharyngeals separate, the teeth paved; preopercle with a membranaceous border; dorsal spines 10, slender, rather high, the last connected with the soft rays; soft dorsal and anal long; anal spines 2, the second not large; caudal fin emarginate; gill membranes slightly connected; gill rakers slender. This genus is distinguished from *Sciæna* chiefly by the obsolescence of the teeth in the lower jaw, and by the more paved teeth of the pharyngeals. The soft rays of the dorsal fin and especially of the anal are more numerous than in related groups. One species. (λεῖος, smooth; στόμα, mouth—the mouth having been originally described as toothless.)

1840. LEIOSTOMUS XANTHURUS,† Lacépède.

(SPOT; GOODY; POST-CROAKER; OLDWIFE; LAFAYETTE.)

Head 3⅓ to 3½; depth 3; snout 3⅓ to 3½. D. X-I, 31; A. II, 12; scales 9-60 to 70-12. Body short, deep, much compressed; back in front of dorsal compressed to a sharp edge; profile steep, convex, depressed over the eyes; dorsal outline convex, highest at front of dorsal; snout very blunt, as long as eye, 3⅓ to 3½ in head; mouth small, inferior, horizontal; maxillary 3 in head, extending to below pupil; no teeth in lower jaw, in the adult; upper jaw with a series of narrow minute teeth; gill rakers short, slender, 8+22; lower pharyngeals small, with three series of molars posteriorly and many villiform teeth anteriorly; preopercle entire; preorbital broad, 1½ in eye; third dorsal spine highest, 1½ in head; soft dorsal with the sheath at its base formed by a single series of scales; caudal long and forked, as long as head; anal long and slightly falcate; second anal spine 2½ in the longest ray, 4 in head; ventrals ⅓ shorter than pectorals, which are as long as the head; scales small, strongly ctenoid, extending on caudal and base of pectorals but not on other fins; lateral line little curved anteriorly; scales below lateral line in oblique series. Color bluish above, silvery below; about 15 narrow dark wavy bands extending from the dorsal downward and forward to below lateral line; a round black humeral spot rather smaller than eye; fins plain olivaceous, the caudal not yellow. This species is one of the most common food-fishes of our Southern coast, being an excellent pan fish. Notwithstanding the numerous nominal species which authors have recognized, there is no evidence whatever of the existence of more than one species of *Leiostomus* on our coasts. South Atlantic and Gulf coasts of United States; Cape Cod to Texas; once doubtfully recorded from Martinique.* (*ξανθός*, yellow; *σὺρά*, tail.)

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* "Ich erlaube mir, diese so charakterisch gezeichnete Art meinem verehrten Freunde, Herrn R. C. Stearns, einem der thätigsten und hervorragendsten Mitglieder der californischen Akademie der Naturwissenschaften als Zeichen meiner Hochachten zu widmen." (Steindachner.)

† The name *xanthurus* is an unfortunate one, as in this species the caudal fin is never yellow. This name came about through confusion with *Bairdiella chrysura*, in which species the caudal fin is bright yellow.

Leiostomus xanthurus, LACÉPÈDE, Hist. Nat. Poiss., IV, 439, pl. 10, fig. 1, 1802, Carolina; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 142, 1830; JORDAN & GILBERT, Synopsis, 574, 1883; JORDAN & EIGENMANN, *l. c.*, 409, pl. 6, 1889.

Mugil obliquus, MITCHILL, Trans. Lit. and Phil. Soc. New York 1815, 405, New York.

Sciæna multifasciata, LESUEUR, Journ. Ac. Nat. Sci. Phila., II, 1821, 255, east Florida (Coll. McClure, Ord, Say & Peale).

Leiostomus humeralis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 141, pl 110, 1830. New York.

Homoprion xanthurus, HOLBROOK, Ichthyol. S. Carolina, Ed. I, 170, 1856; GIRARD, U S. and Mex. Bound. Survey, II, 1859.

Sciæna xanthurus, GÜNTHER, Cat., II, 288, 1860.

Leiostomus obliquus, DEKAY, New York Fauna: Fishes, 69, pl. 60, fig. 195, 1842.

Sciæna obliqua, GÜNTHER, Cat., II, 288, 1860.

587. PACHYPOPS, Gill.

Pachypops, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 87 (*trifilis*).

Fresh-water Sciænoids of Guiana and Brazil, closely allied to *Ophioscion*, but with small barbels in a tuft at the symphysis of lower jaw; teeth feeble; preorbital serrate; mouth very small, inferior; preorbital turgid and cavernous, more or less translucent; first dorsal rather short, the spines feeble; anal short, with weak spines; soft dorsal long; caudal fin rhombic; soft parts of vertical fins closely scaled. Very close to *Pachyurus*, Agassiz, another South American fresh-water genus, from which *Pachypops* differs only in the presence of barbels. (*παχύς*, thick; *ὑπό*, below; *ὤψ*, eye.)

1841. PACHYPOPS FURCRÆUS (Lacépède).

Head 3½; depth 4. D. X–I, 25 to 27; A. II, 6; scales 58. Maxillary scarcely reaching front of eye, its length 4 to 4½ in head; barbels 3, minute (sometimes obsolete); snout prominent, blunt, 2⅘ in head; eye very large, 3 in head; mouth very small, overlapped by the turgid preorbital; teeth small, equal; gill rakers very small; soft dorsal and anal completely scaled; pectorals 1½ in head; caudal rhombic, 1⅓ in head; second anal spine 2⅕ in head; longest dorsal spine 1½. Color uniform dusky, paler below; dorsals punctate with black. Rivers and estuaries from Guiana to Uruguay; common in brackish or fresh waters. According to Dr. Berg it is found in Uruguay in brackish, never in fresh waters. The specimen here described from Rio Negro (Coll. J. C. Fletcher.) (Named in honor of a French naturalist, Fourcroi, who traveled in Brazil.)

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*Cette espèce n'est pas bornée à l'Amérique septentrionale; nous l'avons reçue de Martinique, par M. Plée. (Cuvier & Valenciennes.)

Perca furcræa, LACÉPÈDE, Hist. Nat. Poiss., IV, 398, 424, 1802, Surinam.

Corvina biloba, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 112, 1830, habitat not known.

Corvina furcræa, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 111, 1830.

Pachypops furcræus, STEINDACHNER, Beitr. zur Kenntniss Sciænoiden Brasiliens, 7, pl. 1. 1863; JORDAN & EIGENMANN, *l. c.*, 413; BERG, Ann. Mus. Buenos Aires 1895, 53.

Pachyurus furcræus, STEINDACHNER, Ichth. Beitr., VIII, 12, 1879.

Pachypops biloba, STEINDACHNER, Ichth. Notiz., 206, 1864.

588. GENYONEMUS, Gill.

Genyonemus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 87 (*lineatus*).

Body elongate, moderately compressed, the back little elevated; head oblong, the snout abruptly decurved; eyes moderate, anterior; preopercle with a crenulated membranaceous edge; mouth rather large, subterminal, somewhat oblique; lower jaw with several very small barbels and with a few large pores, the barbels so very small as to be readily overlooked, especially in fresh specimens; teeth equal, in villiform bands, the anterior series scarcely enlarged; first dorsal unusually long, with about 13 spines; anal with 2 spines, the second short and feeble; caudal emarginate; pharyngeal bones and teeth as in *Micropogon;* air bladder simple; gill rakers slender, rather long. Size small. (*γένυς*, lower jaw; *νῆμα*, barbel.)

1842. GENYONEMUS LINEATUS (Ayres).

(LITTLE RONCADOR; KINGFISH; CROAKER.)

Head $3\frac{1}{3}$ to $3\frac{1}{2}$; depth $3\frac{1}{3}$ to $3\frac{2}{3}$; eye $5\frac{1}{3}$; snout 4. D. XIII-I, 21 or 22; A. II, 11; scales 7-54-10. Body oblong, somewhat compressed, the back little elevated; profile little convex, rather abruptly decurved at the snout; mouth subinferior, somewhat oblique; maxillary 3 in head, reaching posterior margin of pupil, lower jaw included; teeth in villiform bands, the outer series above slightly enlarged; chin with 5 small pores and 2 series of minute barbels; preorbital $\frac{2}{3}$ width of eye; preopercle with a crenulate membranous border; opercle with radiating striæ; gill rakers short and slender, 9 + 20; third dorsal spine highest, $1\frac{1}{2}$ to 2 in head; first soft rays of dorsal highest, decreasing in height to the last; caudal lunate; first ventral ray produced as a filament, $1\frac{1}{2}$ in head; pectoral slightly longer than ventrals; scales large, strongly ctenoid, those below lateral line in horizontal series. Color silvery with brassy luster and black punctulations, these forming faint, oblique dark lines along the rows of scales; fins yellowish; a black axillary spot, usually conspicuous. Coast of southern California; San Francisco to Cerros Island; generally common along the coast of southern California. A food-fish of some importance, of good quality, but soft and not keeping well. (*lineatus*, striped.)

Leiostomus lineatus, AYRES, Proc. Cal. Ac. Sci. 1855, 25, San Francisco; GIRARD, P. R. R. Survey, X, 99, pl. 22 B, figs. 1-4, 1858.

Sciæna lineata, GÜNTHER, Cat., II, 288, 1860.

Genyonemus lineatus, JORDAN & GILBERT, Synopsis, 574, 1883; JORDAN & EIGENMANN, *l. c.*, 416, 1889.

589. MICROPOGON, Cuvier & Valenciennes.

(CROAKERS.)

Micropogon, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 213, 1830 (*lineatus*=*undulatus*).

Body moderately elongate, compressed, somewhat elevated; preopercle strongly serrate; teeth in villiform bands, the outer row in the upper jaw enlarged; lower jaw with a row of minute barbels on each side; gill rakers short, thickish; spinous dorsal rather short of 10 or 11 stoutish spines; second anal spine moderate; caudal fin double truncate; lower pharyngeals narrow, distinct, with sharp conical teeth; air bladder with long horns. A well-marked genus, the species all American, allied to *Ophioscion* and *Sciænops*, but distinguished by the presence of barbels; species all closely related, similar in form, size, and color. (μικρός, small; πώγων, beard.)

MICROPOGON:

- *a.* Dorsal rays X–I, 28 to 30.
    - *b.* Scales comparatively small, about 9 in a vertical series between front of dorsal and lateral line, 12 in an oblique series; outer teeth of upper jaw evidently enlarged; dark spots on scales above lateral line not forming continuous stripes: scales 54. UNDULATUS, 1843.
    - *bb.* Scales larger, 7 in a vertical series from front of dorsal to lateral line, 9 or 10 in an oblique series; teeth of outer series in upper jaw scarcely enlarged; dark spots above lateral line forming continuous streaks nearly as wide as interspaces; short vertical bars extending across lateral line; many oblique lines above these; markings more regular, though less sharply defined than in *M. undulatus.*
        - *c.* Second anal spine moderate, 5 in head; eye small, 6 in head; scales 54. FURNIERI, 1844.
        - *cc.* Second anal spine very strong, 2½ to 3 in head; eye very large, 4 to 4½ in head; no distinct oblique streaks above lateral line; axil blackish. Head 4; depth 4⅗. D. X–I, 28; A. II, 7; scales 7–50–14. MEGALOPS, 1845.
- *aa.* Dorsal rays X–I, 24 to 26; snout little projecting; outer teeth above scarcely enlarged; depth 3⅕ in length; back with dark oblique streaks; gill cavity dusky within; scales 48, 53 pores. ECTENES, 1846.
- *aaa.* Dorsal rays X–I, 20 to 22; outer teeth above scarcely enlarged; snout somewhat projecting; body deeper, depth 3⅗ in length; scales 42, 40 pores. ALTIPINNIS, 1847.

1843. MICROPOGON UNDULATUS* (Linnæus).

(CROAKER; RONCADINA; CORVINA.)

Head 3; depth 3⅓. D. X–I, 28 or 29; A. II, 7; scales 9–54. Body rather robust, the back somewhat elevated and compressed, the profile rounded,

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*Dr. Berg speaks of *Micropogon undulatus* as the most common shore fish of Uruguay, being caught each year in millions. He counts: D. X–I, 26 to 29; scales 8 or 9–55–16 or 17. This Uruguayan fish is, therefore, probably not the same as *Micropogon furnieri*, its rays and scales agreeing rather with *M. undulatus*. But the true *undulatus* has not been recorded from the West Indies. It may not unlikely be found that the Brazil-Uruguayan form, *Micropogon opercularis* (Quoy & Gaimard), is a distinct species which has not yet been properly distinguished from *M. undulatus*. The following is the synonymy of *Micropogon opercularis:*

Micropogon opercularis (QUOY & GAIMARD).
Sciæna opercularis, QUOY & GAIMARD, Voy. Uran., Zool., 347, 1824, Rio Janeiro.
Micropogon lineatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 215, 1830, Brazil, Porto Rico, Havana (in part, not types, which were from New York.)
Micropogon undulatus, BERG, Ann. Mus. Buenos Ayres 1895, 54.

not depressed above eyes; head long, the snout prominent, convex. Mouth rather large, nearly horizontal, the maxillary reaching to front of eye, 3 in head; outer teeth above enlarged; eye 2 in snout, 5 in head, rather less than interorbital width. Preopercle strongly serrate along its whole posterior margin, the spines near angle diverging; dorsals nearly separate, the first high, the third spine 3 in head; pectorals moderate, nearly reaching tips of ventrals; ventrals filamentous; anal inserted nearly under middle of second dorsal, the second spine rather weak, shorter than snout, ⅓ length of head; caudal double truncate, 1⅗ in head; 16 scales in an oblique series from vent to lateral line, 12 in an oblique series from dorsal to lateral line. Gill rakers slender, very short, 7+16; cœca 8. Color brassy, paler below; middle part of the body with short, irregular dusky vertical bars crossing the lateral line; many dark brown spots on side of back, irregularly placed, and not forming continuous streaks along the rows of scales; usually some of these coalesce to form 2 dark streaks procurrent with the back. Length 12 inches. South Atlantic and Gulf coasts of the United States; Cape Cod to Texas; generally common along our Atlantic coast, becoming very abundant southward, but not known to extend into the West Indies; a food-fish of some importance. This or a similar species (*Micropogon opercularis*, Cuvier & Valenciennes) is very common on the sand shores of Brazil, Uruguay, and Argentina. (*undulatus*, waved.)

Perca undulata, LINNÆUS, Syst. Nat., Ed. XII, 483, 1766, South Carolina.

Sciæna croker, LACÉPÈDE, Hist. Nat. Poiss., IV, 309, 314, 316, 1802, Carolina.

Bodianus costatus, MITCHILL, Trans. Lit. and Phil. Soc. New York 1815, 417, New York.

Micropogon lineatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 215, pl. 119, 1830, New York. (Coll. Milbert.)

Micropogon undulatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 219, 1830; GIRARD, U. S. and Mex. Bound. Survey, 13, pl. 12, 1859; GÜNTHER, Cat., II, 271, 1860 (in part); JORDAN & GILBERT, Synopsis, 575, 1883; JORDAN & EIGENMANN, *l. c.*, 418, pl. 7.

Micropogon costatus, DEKAY, New York Fauna: Fishes, 83, pl. 72, fig. 230, 1842.

1844. MICROPOGON FURNIERI (Desmarest).

(VERRUGATO; WHITE-MOUTH DRUMMER.)

Head 3⅖; depth 3¼ to 3¾. D. X–I, 30; A. II, 7; eye 6 in head; snout 3; scales 54, 7 in a vertical series from front of dorsal to lateral line, 9 or 10 in an oblique series; teeth of outer series in upper jaw scarcely enlarged; dark spots on back forming continuous dark streaks nearly as wide as the pale interspaces; body a little more slender than in *Micropogon undulatus;* profile almost straight, a little depressed above the eye; snout long; eye small, 1½ in interobital area; preorbital wider than eye; maxillary 3 in head, reaching front of pupil; teeth in broad, villiform bands; preopercle less strongly serrate than in *M. undulatus;* third dorsal spine highest, 1¾ in head; dorsals connected by a low membrane; spinous dorsal with a sheath at its base formed by a single series of scales; soft dorsal naked; second anal spine 5 in head; scales of the breast and head cycloid. Grayish silvery, with bright reflections; a dark spot on opercle; axil dusky;

short vertical bars extending across lateral line; many oblique lines above these; the markings more regular, though less sharply defined than in *M. undulatus,* the general hue more silvery. West Indies; abundant on the coast of Cuba; its southward distribution uncertain, from its confusion with *M. undulatus* and its analogue, *M. opercularis.* The specimens here described from Havana. (Named for its discoverer, Marcellin Fournier, who collected in Cuba.)

Umbrina furnieri, DESMAREST, Première Decade Ichthyol., 22, pl. 2, fig. 3, 1822, Havana. (Coll. Fournier.)

? Micropogon argenteus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 218, 1830, Surinam; may be *M. opercularis* or *M. undulatus.*

Micropogon furnieri, JORDAN, Proc. U. S. Nat. Mus. 1884, 37; JORDAN & EIGENMANN, *l. c.*, 418, 1889.

Micropogon undulatus, POEY, Synopsis, 325 (not of LINNÆUS).

1845. MICROPOGON MEGALOPS, Gilbert.

Head 4; depth 4⅗; eye 4 to 4¼ in head; snout 3⅗. D. X–I, 27 to 29; A. II, 7; scales 7–50–14; maxillary reaching vertical from middle of pupil, 2⅞ in head; snout equaling interorbital width; width of preorbital 1½ in snout. Eye very large, a trifle less than snout; outer series of teeth in upper jaw little enlarged; preopercular spines very strong, arranged as usual in this genus; gill rakers all short, 9 above the angle, 16 below. Dorsal spines stronger than in *M. ectenes,* the third the longest, barely reaching origin of soft dorsal when depressed, equaling length of snout and eye; caudal double truncate; second anal spine strong 2½ to 3 in head; outer ventral ray slightly produced, 1⅔ in head; pectorals extending beyond ventrals, 1⅖ in head; scales of moderate size. Color as usual in this genus; no conspicuous oblique streaks following rows of scales above the lateral line; axil and base of pectorals blackish; lining of gill cavity more extensively black than in other species, the branchiostegal membrane and opercular flap abruptly silvery white within. Gulf of California. Known only from 4 specimens, the longest 10 inches in length. (*μεγάλος*, large; *ὤψ*, eye.)

Micropogon megalops, GILBERT, Proc. U. S. Nat. Mus. 1890, 64, Gulf of California in 14 fathoms; Albatross station No. 3021. (Type, No. not assigned. Coll. *Albatross.*)

1846. MICROPOGON ECTENES, Jordan & Gilbert.

(VERRUGATO.)

Head 3¼ (3⅔ with caudal); depth 3⅕ (4⅔); eye rather large, 6 in head, 1½ in interorbital width, 1¾ in snout, a little less than preorbital width. D. X–I, 25, or X–I, 24; A. II, 7, or II, 8; scales 7–53–13; pores 54. Body rather elongate, moderately compressed, the back little elevated; anterior profile straightish or slightly undulate. Head long, rather low, the snout long and abruptly truncate at the tip, which projects but little beyond the premaxillaries. Mouth nearly horizontal, the lower jaw included, the maxillary barely reaching to opposite front of eye, its length 3⅙ in head.

Teeth in rather broad bands, the anterior in upper jaw little enlarged. Snout with the usual lobes and pores at tip, its length $3\frac{1}{6}$ in head; chin with 5 large pores; about 4 small barbels on the inner edge of each dentary bone anteriorly, these rather shorter than the posterior nostril, which is oblong and much longer than the anterior nostril. Preopercle with numerous rather strong teeth above the angle, which has 2 large, strongly divergent teeth, the lower directed obliquely downward. Gill rakers short, 7 + 12. Pseudobranchiæ well developed. Scales of moderate size, those on the breast little reduced; no scales on the dorsal or anal, except a basal series; caudal largely scaly; about 20 scales in an oblique series from front of anal upward to spinous dorsal, 18 from vent upward to soft dorsal. Lateral line becoming straight well in advance of anal. Spinous dorsal high, higher than in *M. undulatus*, its third spine not very much shorter than the fourth; third spine varying in length, about 2 in head ($1\frac{3}{4}$ to $2\frac{1}{3}$); all the spines freely flexible; longest soft ray $3\frac{1}{4}$ in head; caudal slightly double concave, the upper, middle, and lower rays about equal, $1\frac{3}{4}$ in head; lower rays shorter in young individuals; anal small, ending well in advance of posterior ray of dorsal; second anal spine rather small, its length $3\frac{3}{5}$ in head; longest soft ray $2\frac{1}{2}$ in head. Pectoral fin very long and pointed, reaching past ventrals, but not to vent, its length $1\frac{1}{6}$ in head; ventrals with the first ray filamentous, $1\frac{4}{5}$ in head without filament. Color grayish silvery, without brassy tinge; dorsal region and sides above lower edge of pectorals marked with dark streaks extending obliquely upward and backward along the series of scales. Besides these, about 10 short, oblique, dark bars extending downward and forward, crossing the arched portion of the lateral line, the longest of these about as long as snout; lining of gill cavity blackish; peritoneum pale; fins all yellowish, the tips of spinous dorsal blackish; upper edge of pectoral and border of soft dorsal dusky; region above and below base of pectoral with dark punctulations. Length 2 feet or less. Pacific coast of Mexico; abundant at Mazatlan, where it is an important food-fish; not seen at Panama. (*ἐκτενής*, stretched.)

Micropogon ectenes, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 355, Mazatlan (Types, Nos. 28295, 29538, 28336, 28361. Coll. Gilbert); JORDAN & EIGENMANN, *l. c.*, 419, 1889.

1847. MICROPOGON ALTIPINNIS, Günther.

Head $3\frac{1}{2}$; depth $3\frac{2}{5}$. D. X–I, 20 to 22; A. II, 7; scales 7–48–15. Outer teeth of upper jaw scarcely enlarged; snout somewhat projecting; scales still larger; lateral line 42 (49 pores); scales above the lateral line, vertically, 5 or 6; obliquely, 8; 12 in an oblique series from vent; maxillary extending scarcely beyond the vertical from the anterior margin of the eye; body less elongate than in *Micropogon ectenes;* highest dorsal spines $1\frac{1}{3}$ in head; anal spine about 4 in head. Coloration essentially as in *Micropogon ectenes*, which it closely resembles, differing in the shorter second dorsal. Panama; not rare. (*altus*, high; *pinna*, fin.)

Micropogon altipinnis, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 149, San Jose, Panama, Chiapas; GÜNTHER, Fish. Central America, 387 and 425, 1869; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 111; JORDAN & EIGENMANN, *l. c.*, 419, 1889.

590. UMBRINA, Cuvier.

Umbrina, CUVIER, Règne Animal, Ed. I, 297, 1817 (*cirrosa; Sciæna* L. being restricted to *Sciæna umbra*, a Linnæan, and to *Sciæna aquila*, a non-Linnæan species).

Sciæna, BLEEKER,* Poissons de la Côte de Guinée, 66, 1862 (*cirrosa;* not the earliest restriction to a Linnæan type).

Body moderately elongate; back somewhat arched. Head oblong, with the snout thick and protuberant; mouth almost horizontal, of moderate size; preoperculum with its bony margin finely serrate; lower jaw with a single thickish barbel. Teeth in villiform bands, the outermost in the upper jaw somewhat enlarged. Anterior dorsal with about 10 spines; anal fin with 2 spines, the second not very small. Caudal lunate or truncate. Gill rakers normal, but short. Air bladder well developed. This genus contains a considerable number of species, most of them being American. It agrees with *Sciæna* in nearly all respects, excepting the presence at the chin of a short, thick barbel. A similar barbel is found in the genus *Menticirrhus,* but notwithstanding the fact that all European writers have confounded *Menticirrhus* with *Umbrina,* the two genera are not really very closely related. (*umbra,* shade; the name *umbra* was used for the typical species by early writers, being equivalent to *Sciæna.*)

UMBRINA:

a. Dorsal rays only X–I, 25? no cross bands? BROUSSONETII, 1848.

aa. Dorsal rays X–I, 26 to 29; serræ of preopercle slender, not notably flattened.

b. Body with about 9 dark vertical cross bands, besides narrow undulating streaks along the rows of scales; second anal spine 2⅓ in head; pectorals 1⅔. COROIDES, 1849.

bb. Body without dark cross bands, the rows of scales above with distinct undulating streaks.

c. Snout bluntish, short, 3⅘ in head; serræ of preopercle comparatively numerous and strong, subterete; body rather slender; the dark streaks strongly marked; fins largely yellow. RONCADOR, 1850.

cc. Snout longer than eye, 3 to 3½ in head; preopercle distinctly serrate.

d. Second anal spine large, 2 in head; profile straight, moderately steep; snout rather acute; eye 4⅓ in head; mouth small, inferior, the maxillary reaching middle of orbit, its length 2½ in head; dark streaks on scales strongly marked.

e. Gill cavity pale; scales 5–48; second anal spine 2 in head. XANTI, 1851.

ee. Gill cavity dark; scales 7–51; second anal spine 2¼ in head. SINALOÆ, 1852.

dd. Second anal spine short and thickish, 3 in head. Back elevated, the anterior profile steep and rather convex; snout blunt, much protruding; mouth small, horizontal; the maxillary reaching just past pupil, 3 in head; eye 5 in head; streaks on scales obscure. GALAPAGORUM, 1853.

aaa. Dorsal rays X–I, 30 to 33; preopercle with its edge weakly crenulate; mouth rather large, subterminal; maxillary reaching posterior border of pupil, 2¼ in head; second dorsal spine highest, 2 in head; soft rays high; second anal spine 2 in head; pectorals slightly shorter than ventrals, which are 1⅗ in head; dark streaks faint. DORSALIS, 1854.

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* "Je note ici que l'espèce typique du genre *Sciæna* Art. étant l'*Umbrina cirrosa* CV., le nom de *Sciæna* devra être appliqué aux espèces dont Cuvier a fait des Umbrina, et ne pourra plus être employé dans le sens de Cuvier. Ni M. Günther ni M. Gill, dans leurs travaux sur les Sciénoïdes, paraissent avoir fait attention à ce que le nom générique d'Ar-

1848. UMBRINA BROUSSONETII, Cuvier & Valenciennes.

This species is described as follows: "We find in the collections of Broussonet an *Umbrina* announced at once (which is little probable), as from the South Sea and from Jamaica. Its height is 4 times in its length; its barbel is short and pointed; all its teeth are in fine velvet; the lobes before its upper jaw are little marked, the preopercular denticulations are pronounced; though much altered, we do not see that it has spots, and it certainly seems a distinct species. Its dorsal spines are slender; the second anal is rather strong. Its ventrals are ½ longer than the pectorals. There is reason to believe that the caudal was truncate. Its numbers approach those of the 2 preceeding species. D. X–I, 25; A. II, 6." (Cuvier & Valenciennes; translation.) A doubtful species. If it really came from Jamaica, it may be the same as *Umbrina coroides,* but the fin rays are said to be fewer. Cuvier & Valenciennes counted 29 in *coroides.* The name *broussonetii* has priority over *coroides* if the 2 are the same. (Named for P. M. Auguste Broussonet, doctor of medicine at Montpelier in the last century; an accurate and conscientious naturalist.)

Umbrina broussonetii, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 187, 1830. (Type, a specimen in Broussonet's collection supposed to be from Jamaica.)

1849. UMBRINA COROIDES,* Cuvier & Valenciennes.

Head 3¾; depth 3; eye 3⅔ in head. D. X–I, 27 or 28; A. II, 6 or 7; scales 5–48–10. Body rather stout, the back somewhat elevated; mouth moderate, maxillary extending to middle of pupil; teeth villiform, subequal, in broad bands; preopercle finely denticulate on its bony edge; barbel short; second dorsal spine highest, 1¾ in head; pectoral fins short and small, 1⅔ in head, not reaching to tips of ventrals nor halfway to vent; caudal truncate; second anal spine thick, 2⅓ in head; gill rakers 5 + 9, slender and small. Color silvery, darker above; body with about 9 dark

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tedi est mal employé par les auteurs modernes, et M. Gill citte même le *Sciæna aquila* comme le type du genre." (Bleeker, *l. c.*)

In quoting *Umbrina cirrosa* as the type of Artedi's genus *Sciæna*, Bleeker means merely that it is the one placed first by Artedi in the list of species.

*Jordan & Rutter give the following description of specimens of *Umbrina coroides* in their Fishes of Jamaica: Head 3½; depth 3½; eye 4⅗ in head. D. X–I, 27; A. II, 6; scales 6–50–9. Highest point of dorsal outline at anterior third of spinous dorsal, the anterior outline more strongly curved. Mouth inferior, horizontal or nearly so; teeth equal, in bands; barbel short, blunt; width of preorbital equal to length of eye; nostrils close together, the posterior oblong more than twice as large as anterior, situated immediately in front of eye; preopercle finely and evenly serrate above angle; opercle with 2 dull points, not extending to edge of marginal membrane, the lower somewhat more acute, both evenly projecting; the lobes and pores in front of the mouth well developed. Pectorals as long as ventrals, 1¾ in head, inserted under opercular membrane; ventrals inserted behind pectorals, the outer ray with a very fine filament. Third dorsal spine longest, 2⅕ in head; caudal slightly emarginate, the lower angle slightly rounded, upper and longest rays 1⅗ in head, or equal to head in front of opercle. Ground color steel gray, somewhat, silvery (slightly golden in one specimen); 9 dusky bars on side, the anterior and posterior less distinct, 2 in front of dorsal, 2 under spinous dorsal, the fifth in front of second dorsal, the last at end of dorsal; each row of scales above belly with a dark line, these oblique above lateral line, irregular below; tip of spinous dorsal black, edge of soft dorsal dusky, ventral and tip of caudal faintly dusky, underside of opercle black. This description is based on 3 perfect specimens 10 inches long. They are not so deep as the figure given by Cuvier (117), the caudal is shorter, and there are 2 fewer rays in the dorsal. It seems best not to use the name *Umbrina broussonetii* for this species, as the short account given by Cuvier & Valenciennes does notagree with the species, and Broussonet's specimens may not have come from Jamaica.

cross bands, besides undulating dark streaks along the rows of scales; spinous dorsal blackish. West Indies; Florida to Brazil; common on sandy coasts. Here described from 2 specimens taken by Dr. J. A. Henshall in the Indian River, Florida, the only ones yet recorded from the United States. Our specimens from Jamaica are rather more elongate but are probably the same. (*coro*, a local name of *Conodon nobilis*; *εἶδος*, resemblance, from the dark cross bands.)

Umbrina coroides, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 187, 1830, Brazil; POEY, Enumeratio, 48, 1875.
Umbrina broussonnetii, GÜNTHER, Cat., II, 277, 1860; JORDAN & GILBERT, Synopsis, 576, 1883, specimens described from Indian River, Florida; JORDAN & EIGENMANN, *l. c.*, 422.

1850. UMBRINA RONCADOR, Jordan & Gilbert.

(YELLOW-FINNED RONCADOR; YELLOW-TAILED CROAKER.)

Head 3⅘; depth 3⅓; eye moderate, 1½ in snout, 5½ in head, 1⅓ in interorbital width. D. X–I, 27; A. II, 7; scales 58. Body elliptical-elongate, the back somewhat elevated, the curve from snout to dorsal regular. Head conical, bluntish. Mouth horizontal, the maxillary extending to beyond front of pupil. Caudal lunate, the upper lobe the longer. Second anal spine strong, 2½ in head, a little shorter than third dorsal spine. Pectoral short and small, not reaching tips of ventrals and not halfway to vent, its length 1½ in head. Bright silvery, bluish above, with brassy reflections; sides with narrow, distinct, undulating streaks of deep olive, running from the head and pectoral region upward and backward, with some abrupt curvatures, to the base of the dorsal fin, sometimes alternating with lines of spots; no vertical bars; cheeks pure white; fins mostly yellow; peritoneum black. Length 15 inches. Coast of southern California, Point Conception to Guaymas; rather common about San Diego and southward on shallow sandy shores; a handsome species, brightly colored in life, and of some value as food. (*roncador*, grunter, the Spanish name.)

Umbrina undulata, STEINDACHNER, Ichth. Beitr., III, 21, 1875; not of GIRARD.
Umbrina roncador, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 277, Pequeña Bay, west coast Lower California (Type, No. 29371. Coll. Lieut. Nichols); JORDAN & GILBERT, Synopsis, 576, 1883; JORDAN & EIGENMANN, *l. c.*, 422, 1889.

1851. UMBRINA XANTI, Gill.

(CODORNIZ.)

Head 3⅗; depth 3⅙; eye 4½ in head; snout 3 to 3½. D. X–I, 26; A. II, 6; scales 5–48–8. Snout longer than eye; preopercle distinctly serrate; profile straight, moderately steep; snout rather acute; mouth small, inferior, the maxillary nearly reaching middle of orbit, its length 2½ in head; teeth subequal; gill rakers scarcely developed, 4 + 9; third dorsal spine highest, 1⅔ in head; anterior dorsal rays much longer than posterior ones; anal fin pointed, the second soft ray longest, the second spine very strong, 2 in head; ventrals slightly longer than pectorals, 1⅓ in head; lateral line moderately arched anteriorly. Color bluish, silvery below; conspicuous dark lines following the rows of scales, those below lateral line oblique as well as those above; spinous dorsal dusky; caudal, anal, and ventrals bright yellow; opercles dark within. Pacific coast of tropical America, Cape San Lucas to Panama; a very common and well-known food-fish; taken by Dr. Gilbert, at Mazatlan, Punta Arenas, and Panama. (Named for John Xantus de Vasey.)

Umbrina xanti, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 256, Cape San Lucas (Coll. Xantus); JORDAN & EIGENMANN, *l. c.*, 423, 1889; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 159.

Umbrina analis, GÜNTHER, Fishes Central America, 387 and 426, 1869, Panama.

1852. UMBRINA SINALOÆ, Scofield.

Head $3\frac{9}{10}$; depth $3\frac{3}{5}$; eye $3\frac{3}{4}$; snout $3\frac{1}{3}$; interorbital space $4\frac{1}{4}$; tip of snout to end of maxillary $2\frac{1}{2}$. D. X-I, 28; A. II, 6; scales 7-51-10 (scales 7 between front of dorsal and lateral line, 10 between line and vent; 51 pores in lateral line to base of caudal). Pectoral $1\frac{3}{5}$ in head; ventral $1\frac{2}{5}$; second anal spine $2\frac{1}{4}$; third dorsal spine longest, $1\frac{2}{3}$ in head; gill rakers 6 + 9, rather slender, about $\frac{1}{2}$ as long as pupil; distance from snout to anal $1\frac{1}{2}$ in length of body ($1\frac{1}{3}$ in *xanti*); barbel slender; caudal slightly lunate, the upper lobe the longer. Color dark above, greenish in life, silvery below; a dark blotch on opercle; conspicuous dark-olive stripes follow the center of the scale rows upward and backward on the sides and back, stripes about $\frac{1}{2}$ as wide as pupil; spinous dorsal dusky; ventrals and anal pale, without punctulations; lining of gill cavity quite dark; gill membranes of opercle pale; peritoneum pale. Resembles *U. xanti* very closely; but is distinguished by the dark gill cavity, the small scales, small second anal spine, and more anterior position of anal. The stripes on the body are slightly darker, not so undulating, and there are a few more of them, due to the smaller and more regular scales. Length 8 inches. Mazatlan, Mexico. Several specimens obtained in company with *U. xanti*, and equally abundant.

Umbrina sinaloæ, SCOFIELD, Proc. Cal. Ac. Sci. 1896, 220, pl. 25, Mazatlan. (Coll. Hopkins Exp. to Sinaloa. Type, No. 1632, L. S. Jr. Univ. Mus.)

1853. UMBRINA GALAPAGORUM, Steindachner.

Head $3\frac{3}{5}$ to $3\frac{3}{4}$; depth $3\frac{1}{5}$ to $3\frac{1}{3}$; eye 5 in head; snout longer than eye, 3 to $3\frac{1}{2}$ in head. D. X-I, 28 or 29; A. II, 6; scales 50 to 53. Second anal spine short and thickish, 3 in head. Back elevated, the anterior profile steep and rather convex; snout blunt, much protruding; mouth small, horizontal, the maxillary reaching just past pupil, 3 in head; preopercle finely and sharply serrate; gill rakers very small; pectoral short, $1\frac{1}{2}$ in head; longest dorsal spine 2; caudal fin slightly lunate, the upper lobe the longer; scales above lateral line in very oblique series, in oblique series below lateral line anteriorly. Color, grayish, yellow below; faint dark lines along the scales on the upper half of the body, golden lines on scales below; dorsals finely punctulate; fins pale; gill cavity pale within. Galapagos Archipelago. Here described from 1 of Dr. Steindachner's original types.

Umbrina galapagorum, STEINDACHNER, Ichth. Beitr., VII, 20, 1878, James Island, Galapagos; JORDAN & EIGENMANN, *l. c.*, 423, 1889.

1854. UMBRINA DORSALIS, Gill.

Head 3½; depth 3. D. X–I, 29 to 31. A. II, 7; orbit 4⅓ in head; snout 3¾; maxillary 2⅘; highest dorsal spine 1⅔; second anal spine 2⅕; caudal fin 1⅓; pectorals 1⅖; ventrals 1⅓. Body moderately elongate; back somewhat arched; profile evenly convex from snout to dorsal fin; ventral outline curved, the base of the anal fin but little more oblique than the general ventral contour; caudal peduncle at the narrowest place about 2½ in head. Mouth oblique, rather large, lower jaw included; snout projecting a little beyond premaxillaries; maxillary reaching vertical from the posterior border of pupil; teeth in villiform bands, those of outer row in upper jaw enlarged, stronger in front; interorbital space convex, about 4 in head; preorbital a little narrower than width of orbit; anterior nostril with a raised margin, the posterior part of which forms a low flap; anterior and posterior margins of the other nostril with similar flaps; barbel of lower jaw thick, blunt; edge of preopercle finely serrate; gill rakers short, 5 + 9 or 10. Lateral line becoming straight at a point dorsal to the posterior part of the base of anal fin; scales in lateral line 53; in the series from lateral line to first dorsal spine, 9; to vent, 14 or 15. Dorsal spines moderately strong, the third highest; first dorsal rays highest, the others gradually becoming lower, the last less than ½ the height of first; second anal spine very strong, not reaching tips of last rays of depressed fin; upper lobe of caudal produced, acute, the lower lobe rounded; ventrals slightly filiform at the tips. Color bluish, silvery below, dark streaks along the rows of scales; dorsals rather dusky, growing darker on edges; lower fins creamy reddish. Pacific coast, Cape San Lucas to Panama; rare; recorded from Cape San Lucas, Mazatlan, and Panama. Here described from 2 large specimens (260 and 305 mm. long), taken by Dr. Gilbert at Panama. The original types, from Cape San Lucas, are but 4 inches long. (*dorsalis*, pertaining to the back, from the many dorsal rays.)

Umbrina dorsalis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 257, Cape San Lucas; very young; (Coll. Xantus); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 363; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 107; JORDAN & EIGENMANN, *l. c.*, 423, 1889.

591. MENTICIRRHUS, Gill.

(KINGFISH.)

Menticirrhus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 86 (*alburnus*).
? *Cirrimens*, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 17 (*ophiocephalus*).
Umbrula, JORDAN & EIGENMANN, Review Sciænidæ, 424, 1889 (*littoralis*).

Body comparatively elongate, little compressed; head long, subconic, the bluntish snout considerably projecting beyond the mouth; mouth small, horizontal, both jaws with bands of villiform teeth, the outer teeth in the upper jaw more or less enlarged; chin with a single stoutish barbel; preopercle with its membranaceous edge serrulate; gill rakers short and tubercular or obsolete; dorsal spines high, slender, 10 or 11 in number (13 in *Cirrimens*); second dorsal long and low; caudal fin with the lower angle rounded, the upper sharp; anal fin with a single weak spine; no air bladder. Lower pharyngeals separate, the teeth varying from sharp to very obtuse. This genus is one of the most strongly marked in the family. It has been confounded by all European writers with *Umbrina,* with which it has not very much in common except the presence of the barbel at the chin. All the species are American, and all bottom fishes. The low, elongate body, the large pectorals, and the obsolete air bladder are all characters related to this peculiarity of habit. The genus or subgenus *Cirrimens* (*ophiocephalus*) from Chile differs in the larger number (13) of dorsal spines (*mentum,* chin; *cirrhus,* barbel).

MENTICIRRHUS:

a. Dorsal spines usually 11; head not terete, depressed, with low snout.

b. Gill rakers obsolete, reduced to tubercular prominences, covered with teeth similar to those on the other gill arches, more developed in the young; lower pharyngeals narrow; the teeth villiform or cardiform, all of them acute or conical, none with rounded heads (molar); teeth in the outer series of upper jaw more or less enlarged; scales on breast large.

c. Soft dorsal rather short, its rays I, 18 to I, 22; snout prominent.

d. Snout very prominent, 3½ in head, its tip projecting beyond the premaxillaries for a distance about ⅔ diameter of eye; spinous dorsal elevated, its longest spines 1⅕ in head, reaching beyond front of soft dorsal; eye large, but much smaller than in *M. nasus,* 5½ in head; pectorals 1⅕ in head. SIMUS, 1855.

dd. Snout less prominent, about 4 in head, its tip not recurved.

e. Dorsal rays X–I, 22, the spines rather high; eye very large, 4½ in head, snout much projecting; pectoral 1⅓ in head.
NASUS, 1856.

ee. Dorsal rays X–I, 19 or 20; dorsal spines lower, the longest barely reaching soft dorsal.

f. Snout rather short and blunt, 3⅔ in head, projecting beyond premaxillaries nearly ½ a diameter of the eye; eye small, 7 in head; maxillary reaching to posterior margin of pupil, 3 in head; outer teeth of upper jaw much enlarged; pectoral long, 1¼ in head; ventral 2⅖ in head; longest dorsal spine as long as pectoral; upper lobe of caudal acute, lower lobe rounded, brownish above, lighter below; lower fins with considerable black.
PANAMENSIS, 1857.

cc. Soft dorsal longer, its rays I, 23 to I, 25.

g. Mouth comparatively large, the maxillary reaching to below middle of eye, 2¾ to 3¼ in head; teeth on lower pharyngeals acute; back and sides usually with oblique dusky bars; lower lobe of caudal the longer.

h. Outer teeth of upper jaw decidedly enlarged; dorsal spines not much elevated, the longest usually not reaching front of soft dorsal, 1½ to 1⅔ in head. Coloration, grayish silvery, the dark markings not pronounced and often obsolete.

i. Dorsal rays X–I, 22 or 23; snout rather shorter and less pointed than in *M. americanus,* 3½ in head; mouth smaller, the maxillary 3 in head. Coloration usually plain, sometimes very dark, otherwise as in *Menticirrhus americanus.*
MARTINICENSIS, 1858.

ii. Dorsal rays X–I, 24 or 25; snout longer, 3⅓ in head; maxillary reaching nearly to middle of eye, 2⅘ to 3 in head; eye small, 2 in snout; teeth villiform, in broad bands, the outer series of the upper jaw very much enlarged, larger than in the other species; ventrals short, 1½ in pectorals; pectorals 1¼ in head; caudal *f*-shaped, the broad rounded lower lobe longer than the acute upper; scales all ctenoid, those of the breast larger and regularly placed. Color grayish silvery, with obscure darker clouds along the back and sides, these marks forming dusky bars, running obliquely forward and downward to considerably below the lateral line, these often obsolete; the bar at the nape saddle-like; lining of gill cavity dusky; pectoral yellowish, dusky at tip; an obscure dusky streak along the lower parts of sides running into lower lobe of caudal. AMERICANUS, 1859.

hh. Outer teeth of upper jaw less enlarged; spinous dorsal elevated, the longest spine reaching past front of soft dorsal, its length 1½ in head; coloration strongly marked, body scarcely silvery; eyes small, 2⅓ in snout, 2 in interorbital area, about 7 in head; snout long, bluntish, 3⅕ in head; mouth large; maxillary reaching middle of eye, 2⅕ in head; pectorals 1⅐ in head. Color dusky gray above, sometimes blackish, the back and sides with distinct dark oblique cross bands running downward and forward, the anterior 1 at the nape extending downward, meeting the second and thus forming a V-shaped blotch on each side; a dark lateral streak bounding the pale color of the belly, most distinct posteriorly, and extending on lower lobe of caudal; inside of gill cavity scarcely dusky; pectorals dark. SAXATILIS, 1860.

gg. Mouth smaller, the maxillary reaching scarcely to front of eye, 3⅓ in head; teeth on lower pharyngeals bluntish; coloration grayish, with dark streaks along the rows of scales. Snout long, little projecting, 3⅕ in head; eye small, 7 in head, 2¼ in snout, 1⅘ in interorbital area; outer teeth in upper jaw moderately enlarged; lower pharyngeals a little broader than in *M. americanus*, the teeth coarser, and many of them bluntish, none of them really molar; pectorals 1⅐ in head; scales all ctenoid. Color sooty grayish, with bright reflections; the back, all the fins, and under side of head dusky; undulating lines along sides running upward and backward, made of dark points in center of each scale; back often with very faint dark cross bars; edge of opercle dusky; lining of gill cavity slightly dusky. UNDULATUS, 1861.

UMBRULA (*umbra*, shade):

bb. Gill rakers present, very short and rather slender; lower pharyngeals rather broad; some or most of the teeth molar, that is, enlarged, with thickened rounded heads, the molar teeth covering at least the anterior portion of the bone; teeth in the outer series of upper jaw scarcely larger than the others: scales on breast small.

j. Upper lobe of caudal longer than lower; scales rather small, about 25 in an oblique series from vent forward to lateral line; axillary scale ⅓ length of pectoral; snout very little projecting; gill rakers very short, 3 + 5, the longest about ⅓ diameter of pupil; lower pharyngeal bones narrower than in *littoralis;* body more elongate than in other species; eye small, 7 in head; snout long, 3 in head; mouth small, the maxillary scarcely reaching front of eye; anterior soft rays of dorsal almost twice as long as the posterior ones. Color bluish on sides and back, silvery below, without stripes or bands. ELONGATUS, 1862.

jj. Upper lobe of caudal not longer than lower; scales rather large, 15 to 18 in an oblique series from vent upward and forward to lateral line; axillary scale not ¼ length of pectoral; snout distinctly projecting beyond mouth, 3½ in head; gill rakers larger than in other species, the longest about ½ length of pupil, the number $x+7$; lower pharyngeal bones broad. Color silvery gray above, with bluish and bronze reflections, immaculate; a dark bronze shade along sides on level of pectorals, extending to tail and along cheeks; belly below this abruptly white; dorsals light brown, spinous dorsal black at tip, the base narrowly white; caudal pale, its tip usually black; inner lining of pectoral and ventrals blackish; gill cavity pale. LITTORALIS, 1863.

1855. MENTICIRRHUS SIMUS, Jordan & Eigenmann.

Head 3½; depth 4; eye 5⅔ in head; snout 3½. D. X–I, 22; A. I, 8; scales 6–52–10. Body robust; back somewhat compressed and regularly arched; depth about uniform between the first dorsal spine and the first soft ray; caudal peduncle rather heavy; distance from last dorsal ray to beginning of middle caudal ray slightly more than 2 in head. Head subconical; profile steep, slightly depressed over the posterior part of eyes; snout abruptly blunted, turned up anteriorly, suggesting the form of snout in the serpent *Heterodon;* 5 large incisions in the upper lip, 3 large oval and 3 small round pores above them, as in other species of *Menticirrhus*; mouth horizontal, inferior, the snout extending ¼ of its length beyond the premaxillary; maxillary extending past middle of eye, slightly more than 3 in head. Teeth in lower jaw villiform in rather broad bands; upper jaw with a band of small teeth and an outer series of enlarged ones; largest teeth of the outer series slightly longer than the anterior nostril; preopercle with fine widely placed teeth on its membranous border; gill rakers obsolete; pseudobranchiæ very large; lower pharyngeal teeth villiform, those of the inner series much enlarged; first dorsal beginning behind base of pectoral, the first spine minute, the second spine highest, reaching to third dorsal ray, 1⅕ in head; posterior margin of spinous dorsal deeply concave; dorsal soft rays low, subequal; caudal unequally lunate, the upper lobe much the longer, 1⅕ in head; anal inserted under fifth dorsal ray, its spine weak, 5 in head; the anterior anal rays much the longer, but not extending to tip of last rays; ventrals 1⅗ in pectorals; pectorals 1⅙ in head. Scales large, all strongly ctenoid, those in the lateral line and those above it more or less covered with smaller ones; soft dorsal with a very narrow scaly sheath; bases of pectorals and caudal densely scaly, the rest of the fins naked. Color grayish above, lighter below; lower parts of sides with numerous dark points; faint lines following the rows of scales above; spinous dorsal dusky, anal with dark specks; axil and inner margin of pectoral dusky; other fins plain; lining of gill cavity dusky. This species seems to differ from *Menticirrhus nasus* in the size of the eye, the size of the teeth, and the size and shape of the snout. Dr. Jordan has examined the type of *M. nasus* and verified the description of Günther. The large size of the eye in *M. nasus* is not due to the immaturity of the typical example. Pacific coast of tropical America; Mazatlan to Panama, rather common in the surf. Here described from the type. (*simus*, pug-nosed.)

Menticirrhus nasus, JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 107 and 111; not *Umbrina nasus*, GÜNTHER.

Menticirrhus simus, JORDAN & EIGENMANN, Review Sciænidæ, 427, 1889, Mazatlan. (Type, No. 28292. Coll. Gilbert.)

1856. MENTICIRRHUS NASUS (Günther).

Head 3¼; depth 4; eye 4½ in head. D. X–I, 22; A. I, 8; scales 6–54–14. Eye very large; snout projecting beyond lower jaw for a distance about equal to ½ the diameter of the eye; mouth small, inferior, the maxillary reaching to below middle of eye, 3 in head; pectoral 1⅓ in head, caudal fin *f*-shaped, the upper lobe pointed, the lower rounded. Color, silvery; fins blackish. Panama; rare. Here described from the type and from a small specimen, the second known, taken by Dr. Gilbert at Panama. It is close to *Menticirrhus simus*, but the eye is larger, the snout longer. (*nasus*, long-nosed.)

Umbrina nasus, GÜNTHER, Fishes Central America, 387 and 426, 1869, Panama; JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 289.
Menticirrhus nasus, JORDAN & EIGENMANN, *l. c.*, 429, 1889.

1857. MENTICIRRHUS PANAMENSIS (Steindachner).

Head 3⅛; depth 4. D. X–I, 19 to 21; A. I, 9; orbit 7 in head; snout 3⅔; maxillary 3¼; highest dorsal spine 1⅘; anal spine 5; caudal 1⅔; ventrals 2⅖; pectorals 1¼. Body elongate, not much compressed; back elevated, the outline but little curved from snout to first dorsal spine; from the latter point it descends in a straight line to the caudal peduncle; ventral outline rounded; caudal peduncle 3⅓ in head. Head long, somewhat conical; mouth a little oblique; maxillary extending to the vertical from posterior part of pupil, 3 in head; outer teeth of upper jaw much enlarged; those of lower jaw subequal; snout blunt, projecting beyond the premaxillaries nearly ½ the diameter of eye; interorbital space flattish 4⅗ in head; preorbital 7 in head; barbel narrow, with a conical base; gill rakers tubercular. Shape of lateral line like that of dorsal contour; scales in lateral line 50 or 51, in the series from lateral line to first dorsal spine 8, to vent 17 or 18. First dorsal spine minute, the third longest; first dorsal rays highest, the fin becoming gradually lower posteriorly; anal spine weak, ½ as long as the rays; upper lobe of caudal acute, a little shorter than the rounded lower lobe; pectorals large and strong. Color brownish above, lighter below, the lower parts more or less thickly speckled with brownish dots, these disappearing almost entirely on the breast; dorsal and caudal fins dusky, with darker margins; lower fins with considerable black. Pacific coast of tropical America, Mazatlan to Panama; rather common at Panama.

Umbrina panamensis,* STEINDACHNER, Ichth. Beitr., IV, 9, 1875, Panama.
Menticirrhus panamensis, JORDAN & GILBERT, Bull. U. S. Fish Com. 1882, 107; JORDAN & EIGENMANN, *l. c.*, 429, 1889.

1858. MENTICIRRHUS MARTINICENSIS (Cuvier & Valenciennes).

(JEWSHARP DRUMMER.)

Head 3⅖; depth 4½; snout 3½ in head. D. X–I, 22 to 24; A. I, 7; scales 6–52 to 55–10, 54 pores. Mouth comparatively large, the maxillary reaching to below middle of eye, 2¾ to 3¼ in head; teeth on lower pharyngeals acute; outer teeth of upper jaw decidedly enlarged. Dorsal spines not much elevated, the longest usually not reaching front of soft dorsal, 1½ to 1⅔ in head. Lower lobe of caudal longest. Snout rather shorter and less pointed than in *M. americanus;* mouth smaller, the maxillary 3 in head. Coloration usually plain, sometimes very dark; back and sides usually with oblique dusky bars. West Indies to Patagonia; very common on the coast of Brazil, where it replaces the closely related *M. americanus,* from which it is not well separated. Our specimens are from Jamaica. (Named for Martinique, the type locality.)

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* Steindachner's remark, "Die Höhe des längsten 3. Dorsalstachels gleicht der Länge der Caudale oder der Pectorale," is far from correct in adult specimens. The young have the dorsal higher and the pectorals shorter, but agree otherwise fairly with his description. The coloration is much darker than stated by him.

Umbrina martinicensis, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 186, 1830, Martinique; Günther, Cat., ii, 277, 1860; Jordan, Proc. U. S. Nat. Mus. 1886, 539.

Umbrina gracilis, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 189, 1830, Brazil; Günther, Cat., ii, 277, 1860; Jordan, Proc. U. S. Nat. Mus. 1886, 539.

Umbrina arenata, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 190, 1830, Brazil; Günther, Cat., ii, 276, 1860.

Umbrina januaria, Steindachner, Ichth. Beitr., v, 122, 1876, Rio Janeiro.

Menticirrhus martinicensis,[*] Jordan & Eigenmann, *l. c.*, 429, 1889; Berg., Ann. Mus. Buen. Aires 1895, 56.

1859. MENTICIRRHUS AMERICANUS (Linnæus).

(Carolina Whiting; Sand Whiting.)

Head 3½; depth 4 to 5; eye 6⅔ in head; snout 3⅓. D. X–I, 24 or 25; A. I, 7; scales 6–55, 12 pores. Maxillary reaching nearly to middle of eye, 2⅘ to 3 in head; eye small; teeth villiform, in broad bands, the outer series of the upper jaw very much enlarged, larger than in the other species; ventrals short, 1½ in pectorals; pectorals 1¼ in head; caudal *f*-shaped, the broad rounded lower lobe longer than the acute upper; scales all ctenoid, those of the breast larger and regularly placed. Color, grayish silvery, with obscure darker clouds along the back and sides, these marks forming dusky bars, running obliquely forward and downward to considerably below the lateral line, these often obsolete; the bar at the nape saddle-like; lining of gill cavity dusky; pectoral yellowish, dusky at tip; an obscure dusky streak along lower part of sides running into lower lobe of caudal. South Atlantic and Gulf coasts of the United States, Chesapeake Bay to Texas; very common on the sandy coasts of our Southern States, where it is a food-fish of some importance.

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[*] We have examined the types of *Umbrina martinicensis* and *U. gracilis* in the museum at Paris; also numerous specimens in the museum at Cambridge, apparently identical with these, from Rio Janeiro, Rio Grande do Sul, Victoria, Bahia, and Montevideo. The species seems to be as common in South America as its analogue, *M. americanus*, is in North America. The two are exceedingly alike, and *martinicensis* is probably a geographical variety of the other, distinguished perhaps by a slightly smaller number of rays in the dorsal fin. Were it not that the Sciænoid fauna of South America is chiefly different from that of North America, we should scarcely hesitate to place *martinicensis* in the synonymy of *americanus*. *Umbrina januaria* is apparently based upon the specimens from Rio Janeiro examined by us. *Umbrina gracilis* was based on the dried skin of a young example, distorted and varnished. *Umbrina arenata*, as described by Cuvier & Valenciennes, does not differ at all from *M. martinicensis*. As described by Dr. Günther, the scales are 72 to 78 in *arenata*. It is evident, however, that Günther has counted not the pores, but the number of vertical series of scales, and these range from 70 to 80 in nearly all of our species, the number exceeding the number of pores by about 20, and similarly exceeding the number of oblique series. We see no reason, therefore, for not placing *arenata* in the synonomy of *martinicensis*. (Jordan & Eigenmann.)

Alburnus americanus (the Whiting), CATESBY, Nat. Hist. Carolinas, etc., pl. 12, f. 2, 1736, Carolina.

Cyprinus americanus, LINNÆUS, Syst. Nat., Ed. x, 321, 1758, Carolina; based on the Whiting of CATESBY; not *Cyprinus americanus* of the twelfth edition of the Systema Naturæ, which is a Cyprinoid.

Perca alburnus, LINNÆUS, Syst. Nat., Ed. XII, 482, 1876, Charleston. (Coll. Dr. Garden.)

Umbrina phalæna, GIRARD, Proc. Ac. Nat. Sci. Phila. 1858, 167, Indianola, Brazos Santiago; GIRARD, U. S. and Mex. Bound. Survey, 13, 1859.

Centropomus alburnus, LACÉPÈDE, Hist. Nat., Poiss., IV, 249, 257, 264, 1802.

Umbrina alburnus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 180, 1830; GÜNTHER, Cat., II, 275, 1860.

Menticirrhus alburnus, JORDAN & GILBERT, Synopsis, 577, 1883.

Menticirrhus americanus, JORDAN & EIGENMANN, *l. c.*, 430, 1889.

1860. MENTICIRRHUS SAXATILIS (Bloch & Schneider).

(KINGFISH; SEA MINK; NORTHERN WHITING.)

Head 3¾ to 4; depth 4½ to 4⅔; eye 7 in head; snout 3¾. D. X–I, 26 or 27; A. I, 8; scales 7–53, 14 pores. Outer teeth of upper jaw less enlarged; spinous dorsal elevated, the longest spine reaching past front of soft dorsal, its length 1½ in head; coloration strongly marked, body scarcely silvery. Profile slightly depressed above the eyes; eye small, 2⅓ in snout, 2 in interorbital area; snout long, bluntish; mouth large; maxillary reaching middle of eye, 2⅘ in head; ventrals 1½ in pectorals, which are 1⅐ in head; scales all ctenoid. Color dusky gray above, sometimes blackish, the back and sides with distinct dark oblique cross bands running downward and forward, the anterior one at the nape extending downward, meeting the second and thus forming a V-shaped blotch on each side; a dark lateral streak bounding the pale color of the belly, most distinct posteriorly, and extending on lower lobe of caudal; inside of gill cavity scarcely dusky; pectorals dark. Atlantic and Gulf coasts of the United States, Cape Ann to Key West and Pensacola; most common northward on sandy bottoms. An excellent food fish. This species is generally common along the coasts of our Northern States, its greatest abundance being north of the limit of *M. americanus*, a species which it very closely resembles, the differences being of minor importance. Southward its distribution seems to be peculiar. A large specimen was obtained by Dr. Jordan at Pensacola and several small ones at Key West. All these are very dark in color, but not otherwise evidently different from the common northern form. (*saxatilis*, pertaining to rocks.)

Johnius saxatilis,* BLOCH & SCHNEIDER, Syst. Ichth., 75, 1801, New York.

Menticirrhus saxatilis, JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 288 (note on type of BLOCH & SCHNEIDER.)

Umbrina nebulosa, GÜNTHER, Cat., II, 275, 1860.

Menticirrhus nebulosus, JORDAN & GILBERT, Synopsis, 577, 1883.

Menticirrhus saxatilis, JORDAN & EIGENMANN, *l. c.*, 431, 1889.

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* The original type of *Johnius saxatilis*, sent by Schöpf to Bloch, is still in the museum at Berlin, where it has been examined by us. The name *saxatilis* for the Whiting, like that of *regalis* for the Weakfish, came about through a confusion of the vernacular names, the supposed 'Kingfish" being named "*Johnius regalis*" by Bloch, and the supposed "Rockfish," "*Johnius saxatilis*."

1861. MENTICIRRHUS UNDULATUS (Girard).

(California Whiting; Sand Sucker.)

Head 4; depth 4 to 5; eye 7 in head; snout 3⅕. D. X–I, 25 or 26; A. I, 8; scales 7–60–11. Mouth smaller, the maxillary reaching scarcely to front of eye, 3⅓ in head; teeth on lower pharyngeals bluntish. Snout long, little projecting; eye small, 2¼ in snout, 1⅘ in interorbital area; outer teeth in upper jaw moderately enlarged, about as in *M. saxatilis;* lower pharyngeals a little broader than in *M. americanus*, the teeth coarser, and many of them bluntish, none of them really molar, those of the inner posterior corner of the bone much enlarged; highest dorsal spines 1½ in head, their tips reaching to soft rays; ventrals 1½ in pectorals, which are 1⅕ in head; scales all ctenoid. Color sooty grayish, with bright reflections; the back, all the fins, and under side of head dusky; undulating lines along sides running upward and backward, made of dark points in center of each scale; back often with very faint dark cross bars; edge of opercle dusky; lining of gill cavity slightly dusky. Southern California, north to Santa Barbara; rather common along the sandy coasts; a food-fish of moderate importance. (*undulatus*, waved.)

Umbrina undulata, Girard, Proc. Ac. Nat. Sci. Phila. 1854, 148, San Diego, California (Coll. A Cassidy); young individual; Girard, U. S. P. R. R. Survey, x, 101, 1858.

Menticirrhus undulatus, Jordan & Gilbert, Synopsis, 578 and 933, 1883; Jordan & Eigenmann, *l. c.*, 432, 1889.

Subgenus UMBRULA, Jordan & Eigenmann.

1862. MENTICIRRHUS ELONGATUS (Günther).

(Verrugata.)

Head 3⅓; depth 4¾; eye small, 2⅓ in snout, 7 in head; snout long, 3 in head. D. X–I, 22 to 24; A. I, 7; scales 5–53–13. Upper lobe of caudal longer than lower; scales rather small, about 25 in an oblique series from vent forward to lateral line; axillary scale ⅓ length of pectoral; snout very little projecting; gill rakers very short, 3 + 5, the longest about ⅓ diameter of pupil; lower pharyngeal bones narrower than in *littoralis*, the molar teeth smaller, covering the whole anterior part of the bone; conical teeth on posterior part of the bone, the outermost row enlarged; body more elongate than in other species; profile low, little convex; mouth small, the maxillary scarcely reaching front of pupil, 3 in head; second dorsal spine 1⅔ in head, anterior soft rays of dorsal almost twice as long as the posterior ones; caudal with an *f*-shaped margin; ventrals 1⅗ in pectorals; pectorals 1⅗ in head. Color bluish on sides and back, silvery below, without stripes or bands. Pacific coast of tropical America, Mazatlan to Panama; very common in the surf in shallow water. Its relations are evidently with *M. littoralis*, but in several respects it represents a transition toward *Menticirrhus undulatus*, its nearest relative among the typical *Menticirrhi*. This relation prevents us from regarding *Umbrula* as a genus distinct from *Menticirrhus*, as its characters would seem to indicate. (*elongatus*, elongate.)

Umbrina elongata, Günther, Proc. Zool. Soc. Lond. 1864, 148, Chiapas; Günther, Fishes Central America, 387 and 425, pl. 64, fig. 2, 1869.

Menticirrhus elongatus, Jordan & Gilbert, Bull. U. S. Fish Comm. 1882, 107; Jordan & Eigenmann, *l. c.*, 432, 1889.

1863. MENTICIRRHUS LITTORALIS (Holbrook).

(Surf Whiting; Silver Whiting.)

Head 3½; depth 4⅖; eye 6½ in head; snout 3½. D. X–I, 23 to 25; A. I. 7; scales 6–53, 12 pores. Upper lobe of caudal not longer than lower; scales rather large, 15 to 18 in an oblique series from vent upward and forward to lateral line; axillary scale not ¼ length of pectoral; snout distinctly projecting beyond mouth; gill rakers larger than in other species, the longest about ½ length of pupil, the number $x + 7$; lower pharyngeal bones broad, most of the teeth developed as coarse molars, only those along the posterior margin conical; maxillary reaching past front of orbit, 3½ in head; outer teeth of upper jaw scarcely enlarged; longest dorsal spines reaching past front of soft dorsal, the free margin of the fin concave; caudal rather deeply lunate, the lower lobe rounded, the upper pointed; ventrals 1⅗ in pectorals, which are 1⅓ in head. Color silvery gray above, with bluish and bronze reflections, immaculate; a dark-bronze shade along sides on level of pectorals, extending to tail and along cheeks; belly below this abruptly white; dorsals light brown, spinous dorsal black at tip, the base narrowly white; caudal pale, its tip usually black; inner lining of pectoral and ventrals blackish; gill cavity pale. South Atlantic and Gulf coasts of the United States, North Carolina to Texas; generally common in the surf along the sandy shores of the Southern States. It resembles *Menticirrhus americanus* somewhat in external characters so that it has often been confounded with it by careless observers. Its technical distinctions are, however, numerous, and in the form of its pharyngeal teeth it differs in a marked degree from the true *Menticirrhus*. (*littoralis*, pertaining to the shores.)

Umbrina littoralis, Holbrook, Ichthyol. S. Carolina, 1st ed., 142, pl. 20, fig. 1, 1856, South Carolina; Günther, Cat., II, 276, 1860.

Menticirrhus littoralis, Jordan & Gilbert, Synopsis, 933, 1883; Jordan & Eigenmann, *l. c.*, 432, 1889.

592. PARALONCHURUS, Bocourt.

(Corvalos.)

Paralonchurus, Bocourt, Nouv. Archiv Mus. Paris, IV, 21, 1869 (*petersi*).

Polycirrhus, Bocourt, Nouv. Archiv Mus. Paris, IV, 22, 1869 (*dumerili*); not *Polycirrhus*, Grube, 1850, a genus of worms.

Polyclemus, Berg, Ann. Mus. Nac. Buenos Aires 1895, 54 (*dumerili*); substitute for *Polycirrhus*, preoccupied.

Zonoscion, Jordan & Evermann, Check-List, 401, 1896 (*rathbuni*).

Zaclemus, Gilbert, in Jordan & Evermann, Check-List, 401, 1896 (*goodei*).

Body more or less elongate, the head rather slender; preopercle without bony serratures; a row of slender barbels along the inner edge of the dentary bones, and a small tuft at the chin; no pseudobranchiæ; gill rakers obsolete, or nearly so; teeth in bands, the outer above enlarged or not; soft dorsal usually rather long; spinous dorsal and anal moderate; scales moderate or rather small; caudal long. Species rather numerous; South American; closely agreeing in technical characters but divisible into 4 strongly marked groups which may be genera. (παρά, near; to *Lonchiurus*, with which genus they agree in the absence of pseudobranchiæ).

a. Body rather deep, the back somewhat elevated, the depth about 3½ in length; body with black cross bars; barbels slender.

POLYCLEMUS (πολύς, many; κλέμος, twig, from the many barbels):

b. Dorsal rays about IX–I, 22; caudal fin double truncate, the middle rays longest.

c. Pectoral 1½ in head; color grayish, with 6 broad black cross bars on body; outer teeth of upper jaws scarcely enlarged. DUMERILI, 1864.

ZONOSCION (ζόνος, zone; σκιόν, *Sciæna*):

bb. Dorsal rays X–I, 26 to 32; caudal fin obliquely truncate, lunate or *f*-shaped.

d. Dorsal rays X–I, 29, caudal *f*-shaped, the middle rays longest; pectoral 1⅔ in head; outer teeth above somewhat enlarged; black bars on body faint. RATHBUNI, 1865.

aa. Body comparatively elongate, the depth about 4 in length; the back not elevated; color dusky, the dark cross bars faint.

ZACLEMUS (ζά, an intensive particle; κλέμος, twig, from the large barbels):

d. Upper jaw without enlarged teeth in its outer series; barbels conspicuous; pectoral moderate; caudal *f*-shaped, the lower lobe longest.

e. Pectoral 1⅕ in head; color dusky with faint cross bars. D. XI–25 to 27; scales 45 to 48. GOODEI, 1866.

PARALONCHURUS:

dd. Upper jaw with the outer series of teeth enlarged; barbels very slender; pectoral very long; caudal long, pointed.

f. Pectoral very long, somewhat longer than head; caudal pointed, as long as head; color dusky, scarcely barred. D. X–I, 30; scales 50. PETERSI, 1867.

Subgenus POLYCLEMUS, Berg.

1864. PARALONCHURUS DUMERILI (Bocourt).

Head 3½; depth 2⅖. D. IX–I, 25; A. II, 7; orbit 5½ in head; snout 3⅗; maxillary 2⅔; highest dorsal spine 2¼; dorsal ray 2⅗; second anal spine 4; length of caudal 1½; pectorals 1½; ventrals 1⅗. Body rather elongate, the back somewhat elevated, ventral outline a little curved. Head low and small; profile steep, somewhat concave; snout somewhat acute, with large slits and pores; preorbital broad; interorbital area broad, convex, 3 in head; mouth small, entirely inferior; maxillary extending to the vertical from the posterior part of pupil; teeth on jaws small, villiform, the outer scarcely larger; preopercle rounded, its edge with soft cilia which grow larger from above downward; gill rakers 3 or 4 + 7 or 8, minute, thickish; pseudobranchiæ none. Head and body covered with weakly ctenoid scales, 52 in the lateral line. Lateral line much arched anteriorly, becoming straight over the anal fin. A tuft of barbels at the symphysis of the lower jaw, a single row of 8 or 10 barbels running backward along the lower edge of each ramus. Dorsal spines rather stout, the first minute, the third longest, the others gradually growing shorter to the ninth, which is about ⅓ the length of the third spine; soft dorsal lower than spinous, the fin with a scaly sheath at the base, its membranes covered with small scales; ventrals filiform at tip; anal inserted well forward, its first spine about as large as the first dorsal, the second strong; caudal double truncate. Color bluish gray above, silvery below; 6 rather broad, distinct cross bars of dark brown extending from the back down the sides. Membranes of dorsal fins dusky, growing darker in the region of the body bands and on the edges of the fins; caudal dusky, lighter near the base;

ventrals and anal pale, with dusky edges; pectorals a little dusky, darker on the inner side. Length 8 to 12 inches. Panama; abundant on sandy shores; a very strongly marked species. It has been wrongly described as possessing pseudobranchiæ. Our specimens obtained by Dr. Gilbert at Panama. (Named for Auguste Duméril, ichthyologist of the museum at Paris, author of 2 volumes of an unfinished Histoire Natural des Poissons; son of A. M. Constant Duméril, author of Ichthyologie Analytique.)

Polycirrhus dumerili, BOCOURT, Nouv. Arch. Mus. d'Hist. Natur., IV, 22, 1868, La Union (Coll. F. Bocourt); JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 288; note on Bocourt's type.

Genyonemus fasciatus, STEINDACHNER, Ichth. Beitr., II, 31, 1875, Panama; JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 111.

Polycirrhus dumerili, JORDAN & EIGENMANN, *l. c.*, 415, 1889.

Subgenus ZONOSCION, Jordan & Evermann.

1865. PARALONCHURUS RATHBUNI (Jordan & Bollman).

Head 3½ (4⅗ in total); depth 3⅖ (4¼); eye 4½ in head; snout 3¾. D. X–I, 29 or 30; A. II, 9. Lateral line 53 to 55. Body elongate, compressed; back elevated, profile from snout to dorsal straight or slightly S-shaped; ventral outline gently arched, base of anal oblique; caudal peduncle short and compressed. Head low, little compressed. Snout short and blunt, 3¾ in head. Mouth small; maxillary slightly longer than in *P. peruanus*, reaching pupil, 3 in head. Teeth small, villiform, outer enlarged, those of upper jaw largest. Preopercle with a crenulate membranaceous border; least width of preorbital 6 in head. Gill rakers short and rather thick, 5 + 10, lower much smaller. Scales on snout, below eyes, and on anterior part of breast, cycloid; caudal scaly; dorsal and anal nearly scaleless, with a scaly sheath at base. First dorsal spine very short, inserted over base of pectorals; third and fourth equal, 2⅓ in head; anterior dorsal rays 3 in head, posterior 2½; second anal spine 3 in head, longest ray 2; distance between bases of ventrals and anal 3 in body. Pectorals not extending beyond ventrals, 1⅜ to 1¾ in head; ventrals not reaching vent, $1\frac{2}{7}$ to 1⅖ in head, outer ray filamentous; longest caudal ray $1\frac{1}{7}$ in head, the median rays longest, the upper lobe slightly truncate and slightly concave, the lower cut off still more obliquely. Color bluish silvery, more yellow beneath; scales from base of pectorals to caudal with larger dots; back with 4 or 5 very faint broad dusky cross bands, the 1 at end of spinous dorsal largest; a black spot larger than eye near origin of lateral line; membrane of spinous dorsal thickly dusted; soft dorsal with a pale streak through its middle; anal, outer ½ of ventrals, and nearly all of pectorals dusky; caudal rusty at base, followed by a pale area and then a dusky one; a large black humeral spot. Length 7 inches. Related to *Paralonchurus peruanus* (Steindachner), from which it is separated by its shorter pectoral, shorter dorsal spines, longer snout, and more dorsal rays. Panama; rather rare. (Named for Mr. Richard Rathbun.)

Polycirrhus rathbuni, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 162, Panama. (Type, No. 41170. Coll. *Albatross*.)

Subgenus ZACLEMUS, Gilbert.

1866. PARALONCHURUS GOODEI, Gilbert.

Head $3\frac{4}{5}$ to 4; depth 4 to $4\frac{1}{8}$; eye very large, $2\frac{1}{3}$ in interorbital width, 4 in postocular part of head; snout $3\frac{1}{3}$ to $3\frac{2}{3}$. D. XI, 25 to 27; A. II, 7; 45 to 48 rows of scales running obliquely upward and forward from lateral line. Elongate, with broad, heavy head, the temporal region swollen, protuberant, this not the case in *P. petersi;* snout very high and blunt, its anterior profile vertically rounded, little protruding beyond the premaxillaries; rostral and mental pores very large, arranged as usual; symphyseal pore bounded laterally by 2 membranaceous rings continued forward from the mandibular margins, bearing many barbels; this condition also in *P. petersi* and in *Polyclemus fasciatus*, no "multifid barbel" being present; barbels much stronger than in *P. petersi*, widely spaced, forming a conspicuous series along the inner margin of the mandible, becoming crowded into a dense fringe along anterior $\frac{1}{2}$ of margin of interopercle. Mouth oblique, very protractile, maxillary reaching vertical from posterior edge of pupil, a trifle less than $\frac{1}{3}$ head. Teeth slender, villiform, none of them enlarged, those in lower jaw in a narrow band or irregular series, in upper jaw in a moderate band; teeth all brown in color. Preopercle with a membranaceous edge minutely crenate, spinulescent; branchiostegal membrane very wide; pseudobranchiæ obsolete; gill rakers undeveloped, represented by soft tubercles, of which there are 6 to 8 on the horizontal limb of arch, 2 or 3 next the angle sometimes slightly longer and movable. Dorsal spines slender and flexible, the third the longest, equal to length of snout and $\frac{1}{2}$ eye; tenth spine shortest; soft dorsal and caudal densely covered with scales to their tips; no differentiated sheath at base of soft dorsal; first anal spine minute, the second slender but not flexible, $\frac{1}{2}$ to $\frac{2}{3}$ length of longest ray; caudal fin with the lower lobe longer, convex, the upper lobe concave; longest caudal rays $1\frac{3}{7}$ in head; pectorals broad, reaching vertical from tips of ventrals, but not nearly to vent, $1\frac{1}{5}$ in head; outer ventral ray produced into a filament about $\frac{1}{4}$ total length of fin, the longest nonfilamentous ray $1\frac{4}{5}$ in head. Lateral line with a low wide curve, becoming straight over posterior part of anal fin. Color dark brownish above and on sides, with greenish and bluish reflections, white below; back and sides with 4 broad inconspicuous cross bars; the first from predorsal region to base of pectorals; the second from end of spinous dorsal; the third from base of eighth to twelfth; the fourth from twentieth to twenty-fifth rays of soft dorsal, downward and slightly backward; basal portion of anal and outer ventral rays yellow, the outer portions dusky; other fins blackish; lining of opercle dusky. Panama; rare. Longest specimen about a foot. (Gilbert.) This species differs from *P. petersi* conspicuously in the shorter pectoral and caudal, the heavier, blunter snout, the larger eye, the much larger and more numerous barbels, and in the absence of any series of enlarged teeth in front of the premaxillaries. (Named for Dr. George Brown Goode.)

Paralonchurus goodei, GILBERT, Fishes of Panama MS. 1898, Panama. (Coll. C. H. Gilbert. Type. in L. S. Jr. Univ. Mus.)

Subgenus PARALONCHURUS.

1867. PARALONCHURUS PETERSI, Bocourt.

Head 3¾; depth 4; eye 8½ in head; snout 3⅔. D. X–I, 30; A. II, 9; scales 8–50–16. Body long and low; head slender, flattish, somewhat spongy above, with protuberant snout; interorbital area 3¼; mouth horizontal; maxillary 2⅔ in head; teeth in villiform bands; upper jaw with a conspicuous outer row of larger ones; chin with 5 pores, a multifid barbel at the symphysis; rami with a row of slender barbels along inner edge; dorsal low, highest behind; soft dorsal scaled at base only; caudal pointed, as long as head; anal spines small; second spine as long as snout; pectorals very large, 2⅘ in body; scales rather large, cycloid. Color light olive with faint stripes on rows of scales; pectoral dusky; other fins plain. Coast of Central America, rare at Panama. Here described from the type. (Named for Dr. Wilhelm Peters, late ichthyologist at the museum of Berlin, a versatile writer on systematic zoology.)

Paralonchurus petersi, BOCOURT, Nouv. Archives du Muséum, IV, 1869, 22, La Union, San Salvador (Coll. F. Bocourt); JORDAN & EIGENMANN, *l. c.*, 433, 1889.

593. LONCHIURUS, Bloch.

Lonchiurus, BLOCH, Ichthyologia, 1793 (*barbatus* = *lanceolatus*).
Lonchurus, BLOCH & SCHNEIDER, corrected spelling.

Body long and low, the second dorsal with 35 to 40 rays. No pseudobranchiæ; chin with two short barbels, none on sides of mandible. Air bladder peculiar in form,* a short heart-shaped body with 5 horns. Vertebræ 10 + 19 = 29. Otherwise essentially as in *Paralonchurus*, from which the long dorsal and the absence of barbels distinguish it. A singular genus, with 1 known species. (*λόγχη*, lance; *οὐρά*, tail.)

1868. LONCHIURUS LANCEOLATUS (Bloch).

Depth 4 in length. D. X or XI–I, 38 to 40; A. II, 7 or 8; lateral line 60 to 70. Body long and low, the profile straightish, depressed over the eyes;

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* The air bladder is thus described by Dr. Günther (Cat. Fishes, II, 317):

"The form of the air bladder is very peculiar. We may distinguish in it a body and 5 horns. The body is short, heart-shaped, and occupies a place beneath the third and fourth vertebræ only; its point is continued into the middle horn, which in a fish 9 inches long has a diameter of only ½ a line near its origin. It runs along the vertebral line of the abdominal cavity, and, tapering to a fine point, terminates at the posterior extremity of the abdomen. Each of the anterior parts of the heart-shaped body is divided into 2 horns, the posterior of which is turned backward, long, and forms a tube similar to the median, but with the lumen only ½ as wide. It runs along the side of the latter, in a parallel direction, and terminates in a fine point before reaching the extremity of the abdomen. The anterior horn is very short, directed forward and outward, and nearly as thick as the median.

"The body of the air bladder is attached to the fourth vertebra and the nearest parts of the abdomen by such a firm and dense cellular tissue, of a white color, that it can scarcely be distinguished from the membrane of the air bladder. At some distance from the vertebra it becomes gradually thinner, and is lost in the parietal part of the peritoneum. The membrane of the air bladder itself is firm, thick, and of a shining white color, except in the anterior notch of the heart-shaped body, opposite a process arising from the third vertebra. This process forms an arched plate, open at its posterior side, which is directed toward the notch of the air bladder; at the side which is directed toward the belly it is covered with a thick white membrane, forming a sort of cupola, but with the hinder side open. This cupola fits exactly into the notch of the air bladder, which is here closed by a very thin membrane only. There is a string round the cupola from one anterior horn to the other to fasten the air bladder to the cupola."

interorbital area as broad as eye, which is as long as snout; snout small, 10 in head; snout soft, depressed, with conspicuous pore at tip; mouth oblique, subinferior; maxillary reaching a little beyond eye; teeth in fine bands; barbels 2, not longer than eye; preopercle with crenulate, membranaceous margin; upper ray of pectoral much elongate, 2½ in body; caudal elongate lanceolate, 4 in body; first ray of ventral reaching front of anal; anal short and high, its spines weak, inserted before middle of soft dorsal; scales mostly cycloid; lateral line becoming straight above anal. Color brownish; pectoral and caudal fins black, other fins dusky. (Cuvier & Valenciennes.) West Indies to Guiana; rare; not seen by us. (*lanceolatus*, lance shaped.)

Perca lanceolata, BLOCH, Nov. Act. Sc. Copenh., III, 383, 1788, India.
Lonchurus barbatus, BLOCH, Ichthyol., pl. 360, 1793, Surinam; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 193, 1830; described from BLOCH's type.
Lonchurus depressus, BLOCH & SCHNEIDER, Syst. Ichth., 102, 1801, Surinam; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 195, 1830; GÜNTHER, Cat., II, 317, 1860.
Lonchurus lanceolatus, GÜNTHER, Cat., II, 317, 1860; JORDAN & EIGENMANN, *l. c.*, 434, 1889.

594. POGONIAS, Lacépède.

(SEA DRUMS.)

Pogonias, LACÉPÈDE, Hist. Nat. Poiss., III, 138, 1802 (*fasciatus* = *cromis*).
Pogonathus, LACÉPÈDE, Hist. Nat. Poiss., V, 121, 1803 (*courbina*).

Body short and deep, the dorsal outline much elevated, the ventral nearly straight. Mouth moderate, the upper jaw longest; teeth small, in villiform bands, the outer not enlarged; lower pharyngeal bones large, fully united, armed with strong paved teeth; lower jaw with numerous barbels, each about ½ as long as the eye; preoperculum entire, with a membranaceous edge. Dorsal fins slightly connected, the spines high and strong; caudal fin subtruncate; first anal spine short, the second exceedingly large, nearly as long as the soft rays; pectorals and ventrals long; gill rakers short and bluntish. Pseudobranchiæ large. Marine species, reaching a very large size, among the largest of the *Sciænidæ*, 2 species known. (πωγωνίας, bearded.)

a. Body deep, the depth about 2½ in length; snout blunt, 3¾ in head. D. X-I, 21; scales 47; back usually without distinct oblique streaks. CROMIS, 1869.
aa. Body more elongate, the depth about 3 in length; the snout more acute, 3⅝ in head. D. X-I, 19; scales 50; color more silvery, with oblique faint dark streaks along the rows of scales above. COURBINA, 1870.

1869. POGONIAS CROMIS (Linnæus).

(DRUM.)

Head 3⅓; depth 2⅓; snout 3¾ in head. D. X-I, 21; A. II, 5 or 6; scales 5-47-9. Body oblong, the back much elevated, ventral outline almost straight, the depth rapidly diminishing from the first dorsal spine backward; profile rather steep and slightly convex; mouth moderate, inferior, the maxillary not reaching middle of eye, 3⅓ in head; teeth in broad bands, the outer series above scarcely enlarged; snout blunt, longer than eye; lower pharyngeals large, completely united, covered with many blunt molars and a small patch of conical teeth at the outer posterior corner; gill rakers 4 + 12, very short, slender; dorsal spines high but slender, the fourth highest, 2 in head; caudal subtruncate; second anal spine very large, about 2 in head; pectorals about as long as head; scales large, those on breast small. Color grayish silvery, with 4 or 5 broad dark vertical bars, these disappearing with age, usually no oblique dark streaks along rows of scales above; fins blackish. Atlantic coasts of America, Long Island to mouth of the Rio Grande; common on the sandy coasts of the United States, where it reaches a very large size, probably the largest of all the *Sciænidæ*. The largest specimen recorded was taken at St. Augustine, Florida, and weighed 146 pounds. It is rather a coarse fish, of no great value as food. (*chromis*, *χρόμις*, an old name of some fish of this type, from *χρέμω*, to grunt or croak.)

Labrus cromis, LINNÆUS, Syst. Nat., Ed. XII, 479, 1766, Carolina.

Pogonias fasciatus, LACÉPÈDE, Hist. Nat. Poiss., III, 137, 1802; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 210, pl. 118, 1830; GIRARD, U. S. and Mex. Bound. Survey, 11, 1859; GÜNTHER, Cat. Fish., II, 270, 1860.

Mugil grunniens, MITCHILL, Report, in part, Fishes New York, 16, 1814, New York.

Sciæna fusca, MITCHILL, Trans. Lit. and Phil. Soc. 1815, 409, New York.

Sciæna gigas, MITCHILL, Trans. Lit. and Phil. Soc. 1815, 413, New York.

Labrus chromis, SCHÖPF, Schrift. Naturforsch. Freunde, Berlin, VIII, 158, 1788.

Pogonias chromis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 206, 1830; DEKAY, New York Fauna: Fishes, 80, 1842; GÜNTHER, Cat., II, 270, 1860; JORDAN & GILBERT, Synopsis, 568, 1883; JORDAN & EIGENMANN, *l. c.*, 435, pl. 4, figs. 10 and 11, 1889.

Labrus grunniens, MITCHILL, Trans. Lit. and Phil. Soc. 1815, 405.

Mugil gigas, MITCHILL, Report, in part, Fishes New York, 16, 1814.

1870. POGONIAS COURBINA (Lacépède).

Head 3½; depth 3. D. X–I, 19; scales 50. Scarcely distinct from *Pogonias cromis*, the scales a little smaller, the body a little more elongate, the dorsal rays fewer; coloration more silvery, with faint dark streaks obliquely along the rows of scales above. Guiana to Uruguay; rather common in Brazil. (*courbina*, Portuguese name, equivalent to the Spanish and Latin, *Corvina*, croaker, from *Corvus*, crow.)

Pogonathus courbina, LACÉPÈDE, Hist. Nat. Poiss., V, 121, 1803, Rio de la Plata.

Pogonias cromis courbina, JORDAN & EIGENMANN, *l. c.*, 436.

595. APLODINOTUS, Rafinesque.

(RIVER DRUMS.)

Aplodinotus, RAFINESQUE, Jour. de Phys. 1819, 418 (*grunniens*).

Amblodon, RAFINESQUE, Jour. de Phys. 1819, 418 (based on the pharyngeal teeth of *A. grunniens*, supposed to belong to a species of buffalo-fish).

Haploidonotus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 102 (amended orthography).

Eutychelithus, JORDAN, Man. Vert., Ed. I, 242, 1876 (*richardsoni*=*grunniens*).

Body oblong, the snout blunt, the back elevated and compressed; mouth rather small, low, horizontal, the lower jaw included; teeth in villiform bands, the outer above scarcely enlarged; no barbels; pseudobranchiæ rather small; gill rakers short and blunt; lower pharyngeals very large, fully united, with coarse, blunt, paved teeth, as in *Pogonias;* preopercle slightly serrate; dorsal spines strong and high, with a close-fitting scaly sheath at base, the 2 dorsals somewhat connected; second anal spine very strong; caudal double truncate; air bladder very large, simple, with no appendages. Pyloric cæca 7; vertebræ 10 + 14 = 24. Fresh waters of the United States; large, coarse fishes, feeding chiefly on crustacea and mollusks. The genus is apparently allied to *Pogonias,* and both may be descended from allies of *Roncador,* which is intermediate between them and *Sciæna.* (ἁπλὸυς, simple or single; νῶτος, back.)

1871. APLODINOTUS GRUNNIENS, Rafinesque.

(Fresh-water Drum; Gaspergou; Thunder-pumper; Lake Sheepshead; Croaker; Bubbler; White Perch.)

Head 3⅓; depth 2¾; snout 4⅓ in head. D. X, 30; A. II, 7; scales 9–55–13. Body oblong; back much elevated and compressed; profile long and steep, straightish; head slightly compressed; mouth moderate, subinferior, low; the maxillary reaching past middle of eye, 3 in head; eye moderate; teeth in villiform bands, the outer above scarcely enlarged; lower pharyngeals completely united, the teeth less blunt than in *Pogonias;* gill rakers short, thickish, 6+14; preopercle obscurely serrated; snout bluntish, longer than eye; dorsal spines strong and high; second spine highest, 2⅓ in head, a scaly sheath at the base of spines; the 2 dorsals connected; second anal spine very large, more than ½ the length of the head; caudal double truncate; scales rather thin and deep, the series somewhat oblique; scales on breast rather large. Color grayish silvery, dusky above, sometimes very dark; back sometimes with oblique dusky streaks along the rows of scales. Great Lakes to Texas; abundant in all lakes and large streams west of the Alleghanies and east of the plains, reaching a weight of 50 to 60 pounds. Its flesh is not of high quality, and is often tough and ill-flavored and with a rank odor, especially in the Lakes, where it is not often eaten. In Texas and Louisiana it holds a high rank as a food-fish, the quality improving southward. (*grunniens,* grunting.)

Aplodinotus grunniens, Rafinesque, Journ. de Phys. 1819, 88, Ohio River.

Sciæna oscula, Lesueur, Journ. Ac. Nat. Sci. Phila. 1822, 252, pl. 13, Lake Ontario.

Sciæna grisea, Lesueur, Journ. Ac. Nat. Sci. Phila. 1822, 254, Ohio River at Pittsburg, Pa. (Coll. Le Sueur).

Corvina richardsoni, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 100, 1830, Lake Huron; based on an abnormal specimen with but 18 developed rays in the second dorsal; Günther, Cat. Fish., ii, 298, 1860.

Amblodon concinnus, Agassiz, Amer. Jour. Sci. Arts, xvii, 1854, 307, Tennessee River.

Amblodon lineatus, Agassiz, Amer. Jour. Sci. Arts, xvii, 1854, 307, Osage River.

Amblodon neglectus, Girard, Proc. Ac. Nat. Sci. Phila. 1858, 167, Rio Grande; Girard, U. S. and Mex. Bound. Survey, 12. pl. 5, figs. 6–10, 1859.

Amblodon grunniens, Rafinesque, Ichth. Ohiensis, 24, 1820; Girard, U. S. Pac. R. R. Survey, 96, pl. 23, 1858.

Haploidonotus grunniens, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 104; Jordan & Gilbert, Synopsis, 567, 1883.

Corvina oscula, Cuvier & Valenciennes, Hist. Nat. Poiss., v, 98, 1830.

Corvina oscula, Günther, Cat. Fish., ii, 297, 1860.

Corvina (Amblodon) neglecta, Steindachner, Ichth. Notizen, vi, 38, 1867.

596. EQUES, Bloch.

(RIBBON-FISHES.)

Eques, BLOCH, Ichthyologia, 1793 (*americanus*=*lanceolatus*).

Equietus, RAFINESQUE, Analyse de la Nature 1815, 86 (*americanus*); substitute for *Eques*, the latter name being considered too short.

Pareques (GILL MS.) GOODE, Bull. U. S. Nat. Mus., v, 50, 1875 (*acuminatus*).

Body oblong, compressed, the back much elevated anteriorly, rapidly tapering to the narrow caudal peduncle; mouth small, the lower jaw included; preorbital wide; snout with slits and pores well developed; teeth all villiform, in broad bands, the outer scarcely enlarged; preopercle with a fringed border and no bony serræ; scales small, irregular, with smaller ones intermixed, extending on soft fins; gill rakers few, short and slender; dorsal fin very long, of 9 to 15 close-set spines and 36 to 55 soft rays; anterior interneurals closely wedged in behind the occiput; anal small, its spine small; caudal rhombic; pyloric cæca few; vertebræ $10+15=25$. This genus is one of the most remarkable in the family in respect to form as well as to the coloration of its species. (*equus*, horse; *eques*, horseman, the long dorsal spines suggesting the rider.)

PARAQUES (παρά, near; *Eques*):

a. Dorsal rays X to XII–I, 36 to 46, first 4 to 6 of the interneurals wedged in between neurals of second and third vertebræ.

  b. Profile steep, but not vertical; distance from snout to first dorsal spine about equal to depth of body.

    c. Dorsal spines little elevated, not nearly as long as head; back arched; dorsal with 38 to 41 soft rays.

      d. Color deep violet, bronze or gray, without distinct lengthwise streaks; depth $2\frac{5}{7}$ to 3 in length. VIOLA, 1872.

      dd. Color variously dusky or gray, with at least traces of about 7 lengthwise streaks; depth $2\frac{3}{5}$ to $2\frac{3}{4}$ in length. ACUMINATUS, 1873.

    cc. Dorsal spines elevated, the longest $2\frac{3}{4}$ in length of body; soft parts of vertical fins with white spots; body robust, the back much compressed, the general form much as in *Eques acuminatus*, but the caudal peduncle deeper and more compressed; pectorals and ventrals short and equal, $1\frac{1}{7}$ in head. Color, dark brown, a light bar in front of eye extending around the chin, a second pale bar extending around the head immediately behind the eyes, a third extending from in front of dorsal over base of pectorals; a light bar along base of soft dorsal; a light bar extending from behind the elevated portion of the spinous dorsal downward, dividing into two, the branches running straight back, the upper branch to beginning of last fourth of soft dorsal, the lower branch to base of caudal; 2 or 3 light, undulating longitudinal bars below these; fins all dark brown, vertical fins with many whitish stellate spots. Head $3\frac{3}{4}$ in length; depth 3. D. XI or XII–I, 46. PUNCTATUS, 1874.

  bb. Profile very steep. Body deepest below first dorsal spine, thence rapidly tapering to the narrow caudal peduncle. Color olivaceous, 3 dark brown longitudinal bands along the sides, the middle one from eye backward reaching tips of the middle caudal rays. D. X–I, 37. PULCHER, 1875.

EQUES:

aa. Dorsal rays XIV or XV–I, 53; about 9 interneurals wedged in between neurals of second and third vertebræ; profile almost vertical; body highly variegated. with ribbon-like oblique bands. LANCEOLATUS, 1876.

Subgenus PAREQUES, Gill.

1872. EQUES VIOLA, Gilbert.

Head $2\frac{9}{10}$ to $3\frac{1}{5}$; depth $2\frac{5}{7}$ to $3\frac{1}{12}$; eye 4 in head. D. IX or X, 38 to 41; A. II, 7 or 8; P. 17 to 19; scales 50 to 54 in oblique series. Body narrowly wedge-shaped in section, sharply compressed towards dorsal outline, widening below; lower outline of head horizontal, straight; ventral outline a gentle convex curve to base of anal which is moderately oblique; lower outline of caudal peduncle slightly concave; anterior upper profile rising steeply in a very gentle curve to front of dorsal, thence more obliquely to front of soft dorsal where the depth of body is greatest. Snout compressed, with rather prominent blunt tip, which slightly overhangs the mouth; tip of snout and mandible swollen, provided with large mucous pores, a series of 5 in the mandible, 2 transverse series of 5 each in the snout, of which the posterior lateral pair is minute; mouth horizontal or very slightly oblique, the maxillary reaching about to vertical from hinder margin of pupil, its length measured from tip of snout $2\frac{3}{5}$ or $2\frac{3}{4}$ in head. Teeth in lower jaw in a wide villiform band, a few of the outer series anteriorly slightly enlarged; premaxillary teeth in a wide villiform band, the outer series enlarged, forming moderate canines, larger than those in front of mandibular band. Interorbital space narrow, its width contained 5 to $5\frac{1}{3}$ times in head. Preopercle entire, the membranous border sometimes minutely crenulate; opercle ending posteriorly in 2 concealed points, the included opercular membrane covered with fine scales; gill rakers short and weak, 5 above the angle, 9 to 11 movable ones below, the longest about $\frac{4}{9}$ eye. Mandible, gular, and branchiostegal membranes and more or less of the snout naked, the scales extending forward in some specimens to beyond the nostrils, in others scarcely beyond the front of orbits; head otherwise scaled; lateral line following outline of back, strongly curved anteriorly; pores of lateral line minute, placed on small scales, irregularly wedged in between the larger ones; above the lateral line are very oblique series running downward and backward, and also vertical series, about 50 of the former and 90 to 95 of the latter; scales all ctenoid, except those on anterior part of breast, on lower anterior part of cheeks and on interopercle; vertical fins densely covered to near their tips with small ctenoid scales; pectorals and ventrals with series of scales on the membranes; spinous dorsal short, usually nearly triangular in outline, the second spine the longest, the others rapidly decreasing to the last; longest spine usually as long as snout and eye, sometimes shorter; soft dorsal long and low, increasing in height backward, the longest ray about $3\frac{1}{3}$ in head; depth of caudal peduncle equaling its length behind dorsal fin; anterior insertion of anal fin about under middle of soft dorsal, the length of caudal peduncle behind anal $1\frac{2}{5}$ to $1\frac{1}{3}$ in head; second anal spine strong, its length equaling distance from tip of snout to front or middle of pupil, not nearly reaching anal under the third before the last of the dorsal; pectorals reaching to or nearly to the vertical from the vent, $1\frac{2}{5}$ in the head; ventrals short, the outer ray filamentous, $1\frac{3}{5}$ in head; caudal double truncate, sublanceolate, the middle rays projecting much beyond the outer, $1\frac{1}{4}$ in head. Scales cycloid on top and sides of head, elsewhere ctenoid; lateral line more arched than the back, becoming straight slightly behind front of anal fin; soft parts of all the vertical fins scaled to their tips; pectorals and ventrals with series of scales along the membranes. Color in life, plain silvery gray above, silvery below; dorsals and upper portion of caudal dusky translucent; pectorals light-straw color; ventrals mesially orange yellow, the inner ray, the outer ray, and the tips of all the rays bright white; anal deep yellow, the rays margined with black; lower caudal rays yellow; gill cavity dusky, without yellow. Bay of Panama; 3 specimens known, the largest 10 inches long. (Gilbert.) (*Viola*, the violet, from the coloration, which has violet shades.)

Eques viola, GILBERT MS., Fishes of Panama, 1898, Panama. (Coll. C. H. Gilbert. Type, in L. S. Jr. Univ. Mus.)

1873. **EQUES ACUMINATUS** (Bloch & Schneider).

Head 3; depth 2⅗; eye 4 in head; snout 3¾. D. X–I, 38 to 40; A. II, 7; scales 50. Body elongate, compressed; profile rather steep, but not nearly vertical. Distance from snout to first dorsal spine about equal to depth of body. Dorsal spines little elevated, the longest about 5½ in length of body; first 5 or 6 interneurals wedged in between the neurals of the second and third vertebræ, the rest between the third and fourth; interorbital area not quite as broad as eye; second anal spine 2⅓ in head; longest dorsal 1⅗; pectorals 1⅐; mouth larger than in *Eques punctatus*, the maxillary reaching past middle of orbit 3 in head; teeth of upper jaw slightly enlarged; gill rakers short, rather slender, 6 + 9; caudal peduncle and fin less deep than in *Eques punctatus*; second anal spine slightly shorter than soft rays, 2⅓ in head; soft dorsal scaly; scales large, the series below lateral line slightly oblique. Color of the typical West Indian form (var. *acuminatus*) nearly black, with longitudinal whitish stripes on the body, not on the fins; 1 stripe from upper edge of eye straight to upper edge of caudal peduncle, 1 just above this to last rays of soft dorsal, 2 confluent behind from nape to middle of soft dorsal, 2 below the first from pectoral to base of caudal, the lowest to edge of caudal peduncle; fins dusky. South Carolina to Brazil; not uncommon in the West Indies. (*acuminatus*, acuminate.)

Grammistes acuminatus, BLOCH & SCHNEIDER, Syst. Ichth., 184, 1801, no locality given; after Seba.

Eques lineatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 169, 1830, Brazil.

Eques acuminatus, CASTELNAU, Anim. Nouv. ou Rares de l'Amér. du Sud, 10, 1855; GÜNTHER, Cat., II, 280, 1860; POEY, Memorias, II, 370, 1861; JORDAN & EIGENMANN, *l. c.*, 440.

Pareques acuminatus, GOODE, Bull. U. S. Nat. Mus., V, 50, 1876.

Represented on the South Atlantic coast of the United States by—

1873a. **EQUES ACUMINATUS UMBROSUS**, Jordan & Eigenmann.

Essentially similar in form to the typical *acuminatus*, but the color marks obscure. Head 3⅓; depth 2¾. D. X–I, 40; A. II, 7; scales 6–51–10; second anal spine 2⅓; eye 4; snout 4; maxillary 2⅓. Coloration dark smutty brown, with traces only of 7 pale streaks; region at base of soft dorsal darker; spinous dorsal, tips of ventrals, and inside of gill cavity black; fins otherwise smutty.* Southeast coast of the United States, Charleston to Pensacola. (*umbrosus*, shady.)

Sciæna acuminata, JORDAN & GILBERT, Synopsis, 573, 1883.
Eques acuminatus umbrosus, JORDAN & EIGENMANN, Review Sciænidæ, 440, 1889, Charleston and Pensacola.

1874. EQUES PUNCTATUS, Bloch & Schneider.

(SERRANA HISPANA.)

Head $3\frac{3}{4}$; depth 3. D. XI or XII–I, 46; A. II, 6 or 7; scales 8–55 to 59–11 or 12. Dorsal spines elongate, the longest $2\frac{3}{4}$ in length of body; soft parts of vertical fins with white spots; body robust, the back much compressed, the general form much as in *Eques acuminatus*, but the caudal peduncle deeper and more compressed; profile rather steep, depressed over the eye; snout slightly longer than eye, $3\frac{1}{2}$ in head; eye as wide as interorbital region; preorbital broad, as wide as eye; mouth small, subinferior; Maxillary almost extirely concealed below the preorbital, $2\frac{1}{3}$ in head, reaching to below middle of eye; teeth in both jaws in broad bands, the outer series of the upper jaw enlarged; preopercle entire, the membrane with slight cilia; gill rakers small, slender, 6 + 11; lower pharyngeals small; the teeth all conical, those of the posterior angle and inner series somewhat enlarged; anterior dorsal spines as high as body; membranes of the soft portions of the vertical fins closely scaled to the tip; caudal broadly rounded; anal short and high; second spine about $\frac{3}{5}$ of longest ray, 3 in head; anal spine placed midway between base of pectoral and base of caudal; pectorals and ventrals short and equal, $1\frac{1}{7}$ in head. Color dark brown, a light bar in front of eye extending around the chin, a second pale bar extending around the head immediately behind the eyes, a third extending from in front of dorsal over base of pectorals; a light bar along base of soft dorsal; a light bar extending from behind the elevated portion of the spinous dorsal downward, dividing into 2, the branches running straight back, the upper branch to beginning of last fourth of soft dorsal, the lower branch to base of caudal; 2 or 3 light, undulating longitudinal bars below these; fins all dark brown, the soft portions of the vertical fins with many whitish stellate spots. West Indies; a handsomely colored fish not uncommon about Cuba and Hayti. The specimen here described from Havana. (*punctatus*, spotted.)

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* The above account is taken from a specimen from Charleston. Another from Pensacola (Silas Stearns' collection) shows the following characters:

Head $3\frac{1}{5}$; depth 3. D. IX–I, 36; A. II, 7; Lat. l. 53. Back somewhat elevated, the profile steep and nearly straight from the tip of the conical and rather pointed snout to the base of the dorsal. Mouth not large, the maxillary extending to below the middle of the eye. Lower jaw included; both jaws with broad bands of villiform teeth, the anterior series in the upper jaw considerably enlarged. Scales on the head scarcely ctenoid above, cycloid on the cheeks. Gill rakers short rather stout. Pectorals very short, not reaching halfway to the tips of the ventrals, and but halfway to the anal; as long as from the snout to the edge of the preopercle; anal fin small, its tip not reaching to the last ray of the second dorsal, its spine robust, nearly as high as the fin, $\frac{1}{2}$ the length of the head; first dorsal small, with slender spines; second dorsal very long, its tip nearly reaching caudal. Eye rather large. Coloration everywhere blackish, with traces of about 10 narrow horizontal pale streaks along the sides; spinous dorsal and tips of ventrals quite black; other fins smutty; gill cover black within.

Serrana hispanis, PARRA, Piezas Hist. Nat. Cuba, 2, pl. 2, lower figure, 1787, Cuba.
Eques punctatus, BLOCH & SCHNEIDER, Syst. Ichth., 106, 1801, Cuba (based on PARRA, 2, pl. 2, fig. 2); CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, pl. 167, 116, 1830; GÜNTHER, Cat. Fish. Brit. Mus., II, 281, 1860; POEY, Synopsis, 325, 1868; POEY, Enumeratio, 49, 1875; JORDAN & EIGENMANN, *l. c.*, 441, 1889.

1875. EQUES PULCHER, Steindachner.

Head 3⅔ to 3½ in total length; depth the same. D. X–I, 37 or 38; A. II, 7; scales 50. Profile very steep, "steeper than in *Eques lanceolatus.*" Body deepest below first dorsal spine, thence rapidly tapering to the narrow caudal peduncle; eye 3 in head; snout 1½ in eye; mouth subinferior, the thick convex snout projecting beyond it; first ventral ray filiform, 3⅓ in body; longest dorsal spines 1⅔ to 2⅔ in length of body, their height nearly twice that of the body below them. Color olivaceous, 3 dark-brown longitudinal bands along the sides, the middle one from eye backward reaching tips of middle caudal rays; the upper from occiput backward to end of soft dorsal; the lower from lower corner of eye to behind anal; 2 very faint broad cross bars, the anterior from base of first dorsal to ventrals, the next from middle of soft dorsal to anal; tip of snout and chin black; an oblique bar below eye; spinous dorsal, pectoral, and ventral black, edged with white; edges of caudal yellowish; anal with brown points anteriorly. (Steindachner.) Barbados; not seen by us. (*pulcher*, pretty.)

Eques pulcher, STEINDACHNER, Ichth. Notizen, VI, 43, 1867, Barbados; JORDAN & EIGENMANN, *l. c.*, 441, 1889.

Subgenus EQUES.

1876. EQUES LANCEOLATUS (Linnæus).

(RIBBON FISH; GUAPENA; SERRANA.)

Head 4; depth 2⅖; eye 4. D. XIV to XVI–I, 53; A. II, 5; scales irregular, with smaller ones intermixed; about 12 of the anterior interneurals wedged in between the occiput and the neural spine of the third vertebra; distance from tip of snout to first dorsal spine much less than depth of body. Body deepest below first dorsal spine, rapidly tapering to the narrow caudal peduncle; profile very steep, little convex; eye little longer than snout; preorbital broad, nearly as wide as eye; mouth small, slightly oblique; maxillary reaching to below anterior fourth of eye; teeth all villiform in broad bands, the outer scarcely enlarged; preopercle with a fringed membranous border; gill rakers very short and slender, 6 + 9; anterior dorsal spines much elongate, 1¾ in body; soft rays low, the membranes scaled to the tips; anal small, its second spine 3 in head; ventrals 1⅓ in head; pectorals scarcely shorter. Color, light yellowish; a narrow brownish band from the corner of the mouth up across the middle of the eye and meeting its fellow on top of head; another broader band edged with a narrow white line on each side from the nape down and back over opercle, meeting its fellow between the ventral fins and extending to the tips of their outer rays; a third and still broader band, also bordered by white, extending from the tips of the dorsal spines to their base, then downward and backward to the tips of the middle caudal rays; body below this band silvery white, above it somewhat darker. West Indies, ranging northward to Pensacola; rather common southward; an interesting fish of a beautiful and singular coloration, resembling that of a chætodont. The specimen described by us was taken near Pensacola. (*lanceolatus*, lance-shaped.)

Ribband Fish, EDWARDS, "Gleanings, pl. 210," Guadeloupe; Carolina.

Chætodon lanceolatus, LINNÆUS, Syst. Nat., Ed. x, 277, 1758, Caraibes Islands; based on EDWARDS, pl. 210.

Serrana, PARRA, Piezas de Hist. Nat. de Cuba, pl. 2, upper figure, 1787, Cuba.

Eques americanus, BLOCH, Ichthyol., pl. 347, 1793, West Indies.

Eques balteatus, CUVIER, Règne Animal, Ed. 2, II, pl. 29, fig. 2, 1829, Martinique; after EDWARDS; CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 165, 1830.

Sciæna edwardi, GRONOW, Cat. Fish., Ed. Gray, 53, 1854, Indian Seas; after EDWARDS.

Eques lanceolatus, GÜNTHER, Cat., II, 279, 1860; POEY, Enumeratio, 49, 1875; JORDAN & GILBERT, Synopsis, 932, 1883; JORDAN & EIGENMANN, *l. c.*, 442, 1889.

Group CIRRHITOIDEI.

(THE CIRRHITOID FISHES.)

This group agrees with the *Percoidea* in most respects, the chief external difference lying in the form of the pectorals, which have broad procurrent bases as in the *Scorpænidæ*, the lower rays being unbranched and more or less thickened. One family [*] is represented in our waters.

Family CLVI. CIRRHITIDÆ.

(THE CIRRHITOIDS.)

Body compressed, oblong, covered with moderate scales which are cycloid or ctenoid; lateral line continuous, concurrent with the back, not extending on caudal; mouth low, terminal, with lateral cleft; eye lateral, of moderate size; premaxillaries protractile; maxillary narrow, not sheathed by preorbital; teeth small, pointed, occasionally with canines sometimes present on vomer or palatines; cheeks without bony suborbital stay; branchiostegals 3 to 6, usually 6; gill membranes separate, free from the isthmus; preopercle serrate or entire; opercle unarmed; no spines or serrations on bones of cranium; dorsal fin continuous, long, the spinous and soft parts subequal, the spines not depressible in a groove; soft dorsal low; spines rather low and strong; pectoral fin short and broad as in the *Cottidæ*; lower half of fin with its rays simple and generally stout; the membranes deeply incised; ventral fins thoracic, but considerably behind root of pectorals, the rays I, 5; air bladder large and complicated or wanting; pyloric cæca few; vertebræ 10+16=26; skull very compact and solid.[†] Carnivorous fishes of the warm seas; genera 10; species 40; appar-

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[*] This family should apparently be placed among the *Percoidea* near the *Serranidæ*.

[†] Dr. Günther gives in substance the following description of the skeleton of *Parracirrhites forsteri* (Bloch & Schneider):

"Skull compressed, all the bones well ossified, and very solid. Intermaxillary much shorter than maxillary, and having posterior processes of moderate length. Maxillary slightly bent, sword-shaped, broadest at extremity. Mandibulary having some small pores along lower side. Head of vomer thick, swollen, and armed with teeth on anterior margin only. Preoperculum crescent-shaped, without angle, and with posterior part of ently really allied on the one hand to the *Serranidæ*, with which group Dr. Boulenger finds that the skeleton has much in common; on the other hand, they show affinities with the *Scorpænidæ*. Through such forms as these the great group of *Loricati* or Mail-Cheek fishes may be connected with their perch-like ancestors. (*Cirrhitidæ*, Günther, Cat., II, 71–86, 1860.)

a. Teeth on vomer and palatines; jaws with canines; scales on cheeks very small; dorsal spines 11 or 12. CIRRHITES, 597.

597. CIRRHITES, Lacépède.

Cirrhites, LACÉPÈDE, Hist. Nat. Poiss., V, 3, 1803 (*maculatus*).
Cirrhitichthys, GÜNTHER, Cat. Fishes, II, 73, 1860; not of BLEEKER.

Body oblong, compressed, formed much as in *Sciæna*, covered with large cycloid scales; head rather obtuse; scales on cheeks very small; premaxillaries not produced; teeth on vomer and usually on palatines also; jaws with small canine teeth; anterior nostrils fringed; preopercle evenly curved, its edge finely serrate. Soft parts of vertical fins scaled at base. Dorsal rays 11 or 12; caudal truncate. (*cirrhus*, a lock of hair or a barbel; referring to the simple pectoral rays.*)

a. Color green with irregular spots and curved bands of dark brown, edged with pale blue. RIVULATUS, 1877.
aa. Color yellowish with 4 complete oblique bands of black not edged with blue, besides black spots; caudal with a B-shaped black spot. BETAURUS, 1878.

1877. CIRRHITES RIVULATUS, Valenciennes.

Head $2\frac{2}{3}$; depth 3. D. X, 11; A. III, 6; scales 6–47–14. Eye 6 in head, with opercular flap. Snout moderate, compressed, and rather elevated; maxillary extending to middle of eye; small bands of villiform teeth in jaws, an outer row of strong canine-like teeth on the sides of jaws, with strong canines towards the front, canines about $\frac{4}{6}$; interorbital space deeply concave, $\frac{4}{5}$ in eye; a low longitudinal median crest on crown of head; preopercle finely serrate behind in the young, entire in adult; gill rakers very short and thick, about 5+10. The fourth, fifth, and sixth dorsal spines longest, 4 in head, of moderate strength. Pectoral very broad, rather short, not reaching tips of ventrals, its lower rays much swollen. Second anal spine longer than third. Color brownish green, with transverse dark-brown spots and short bands, all of which are edged

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margin minutely serrated; interior ridge very low. Outlines of operculum very irregular; posterior margin notched, but there are no spines; interior margin waved. Interoperculum bent, with side joining suboperculum emarginate. Suboperculum elongated, with posterior extremity produced beyond operculum. Preorbital broad, rhomboid. Space between orbits rather narrow and flat. Occipital crest well developed, triangular; lateral crests scarcely visible. Bones of humeral arch rather strong, and both the coracoid bones joined together by a long horizontal suture. Lower extremity of radius provided with several peculiar processes. Pubic bones rather elongate and narrow, each of them formed by three lamellæ of nearly equal development. Ten abdominal and 16 caudal vertebræ, length of former portion of vertebral column being to that of caudal as 1:1.5. Neural and hæmal spines of moderate length and strength, each of the interneurals dilated. The first interhæmal very strong, and evidently formed by 2; it has 2 ridges on each side, and a low one anteriorly."

* Described by Lacépède as, "Des barbillons réunis par une membrane, et placés auprès de la pectorale, de manière à répresenter une nageoire semblable à cette dernière."

with light blue; these bands and spots singularly arranged; 2 of these bands on the head, crossing preopercle; 2 others on preorbital; 5 on body and caudal peduncle, composed of large, more or less confluent, roundish spots, the 2 below the spinous portion of the dorsal terminating above in a pair of large spots; caudal with similar ocellated spots, the pale color appearing as reticulations around them; 2 large ocelli on anal; a brown band across the inner side of base of pectoral. Length 14 inches. Cape San Lucas to the Galapagos Islands; not rare about rocky islands; an interesting and curiously colored fish. Here described from specimens from the Revillagigedos; the young unknown, unless *C. betaurus* should be the young as has been supposed. (*rivulatus*, marked by rill-like streaks.)

Cirrhites rivulatus, VALENCIENNES, Voyage Vénus, Poiss., 309, pl. 3, fig. 1, 1855. Galapagos Islands.

Cirrhitichthys rivulatus, GÜNTHER, Fish Centr. Am., 421, pl. 86, fig. 4, 1868.

1878. CIRRHITES BETAURUS, Gill.

Head 2¾; depth 3. D. X, 11; A. III, 5. Preoperculum serrated behind. Eye (in young) 3½ in head, equal to snout. Fourth dorsal spine longest and equals ⅑ of the total length; second anal spine largest, equaling the fourth dorsal one; longest soft ray 6⅗ in total length; caudal fin slightly emarginate and nearly ⅕ of the length; produced pectoral ray rather exceeding ¼ of the length, and the ventral fin enters 5½ times in the same. Color pale yellowish on the body, blackish on the shoulders and from the dorsal fin to the eyes, and with 4 complete, oblique, blackish bands; the first under the middle of the spinous dorsal, the second under the last spine, the third under the middle of the soft dorsal, and the fourth encircling the caudal peduncle; head with 3 lateral bands, 1 on the preorbital region, a second on the cheek, and third on the posterior margin of the preoperculum; operculum with a longitudinal oblong spot; chin with 4 spots forming the angles of a rhomb, and there is another one behind, on the branchiostegal membrane near the margin; spinous dorsal margined with blackish, and the 2 bands beneath more or less ascend on it; anal blackish; caudal with a blackish B-shaped mark and a band at its base divided by the lateral line; pectoral dusky, with a black spot at its base nearly surrounded by a clear area, and separated from a spot in front of the base; ventrals blackish, with nearly transparent sides and margin. Rock pools between tide marks about Cape San Lucas and Mazatlan; abundant; a very active and strikingly colored little fish. The largest specimens known are 2½ inches long. The adult is unknown unless *Cirrhites rivulatus* should prove to be such. There is no important difference in form or structure, but the coloration of the two is very different, and suggests that the two are distinct species. (*βῆτα*, the letter B; *οὐρά*, tail.)

Cirrhites betarus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 259. Cape San Lucas (Coll. John Xantus): young, of 1½ inches.

Suborder HOLCONOTI.

(The Surf-fishes.)

We recognize the singular family of *Embiotocidæ* as constituting a distinct group or suborder allied to the *Percoidea* on the one hand and to the *Pharyngognathi* on the other, but without very close affinities with either. The structures connected with the viviparous habit, the united pharyngeals, increased number of vertebræ, double nostrils, perfect gills, and many rays in the soft dorsal and anal, together with the unarmed bones of the head, constitute the chief characters of the *Holconoti*. (ὅλκος, groove; νῶτος, back.)

Family CLVII. EMBIOTOCIDÆ.*

(The Surf-Fishes.)

Body ovate or oblong, compressed, covered with cycloid scales of moderate size. Cheeks, operculum, and interoperculum scaly; lateral line continuous, running high, without abrupt flexure, not extending on the caudal fin; head rather short; mouth small, terminal; jaws with conical or compressed teeth of moderate or small size, in 1 or 2 series; teeth wanting in 1 genus (*Neoditrema*); no teeth on vomer or palatines; no canines; lower pharyngeals united, without suture, their teeth conical or paved; upper jaw freely protractile; lips full, the lower either forming a free border to the jaw or else attached by a frenum at the symphysis; maxillary short, without supplemental bone, slipping for most or all of its length under the preorbital; opercular bones entire; branchiostegals 6 (or 5); gill rakers usually slender; gill openings wide, the membranes free from the isthmus or very slightly connected; pseudobranchiæ present; gills 4, a slit behind the fourth; nostrils round; the openings 2 on each side; dorsal fin single, long, with 8 to 18 usually slender spines, which are depressible in a groove; a sheath of scales along the base of the anterior part of soft dorsal and posterior part of spinous dorsal; this sheath separated by a furrow from the scales of the body; anal fin elongate with 3 moderate or small spines and 15 to 35 slender soft rays, its form and structure differing in the two sexes; ventral fins thoracic, I, 5; pectorals moderate; caudal forked; oviduct opening behind the vent, the two apertures always distinctly separated; air bladder large, simple; no pyloric cæca; vertebræ 13 to 19+19 to 23=32 to 42. Viviparous. The young are hatched within the body, where they remain closely packed in a sac-like enlargement of the oviduct analogous to the uterus until born. These fœtal fishes bear at first little resemblance to the parent, being closely compressed and having the vertical fins exceedingly elevated. At birth they are from 1½ to 2½ inches in length, and similar to the adult in appearance, but more compressed and red in color. Since the announcement of their viviparous nature by Prof. Louis Agassiz, in 1853 and by

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* For an account of the genera and species of *Embiotocidæ* and a detailed description of the development of *Cymatogaster aggregatus*, see Eigenmann, on the Viviparous Fishes of the Pacific Coast of North America, Bull. U. S. Fish Comm. 1892 (1894), 381-478.

Dr. William P. Gibbons in 1854, these fishes have been objects of special interest to zoologists. Fishes of the Pacific coast of North America inhabiting bays and the surf on sandy beaches. One species (*Hysterocarpus traski*) inhabits fresh waters; 3 others (*Ditrema temmincki, Ditrema smittii,* and *Neoditrema ransonneti*) are found in Japan. These species reach a length of from 6 to 18 inches, and are very abundant where found. They are much used for food, but the flesh is comparatively poor, tasteless, and bony. Most of them feed on crustacea, but 1 genus (*Abeona*) is partly or wholly herbivorous. Genera 17; species about 20.

HYSTEROCARPINÆ:

I. Spinous dorsal longer than the soft part, of 16 to 18 spines; second anal spine the largest. Vertebræ 14 + 20 = 34.

a. Scales large; teeth moderate, conical, in 1 series; lower lip without frenum; about 12 of the medium posterior teeth of pharyngeals large, all but the median 3 of these obliquely truncate molars, the rest small; gill rakers short, slender, 6 + 12. HYSTEROCARPUS, 598.

EMBIOTOCINÆ:

II. Spinous dorsal shorter than the soft part, 8 to 11 spines; anal spines graduated.

b. Teeth incisor-like, most of them obtusely 3-lobed; lower lip with a narrow frenum; outer series of pharyngeal teeth small, conic; the rest (about 32) large molars closely appressed; anal basis below 7 caudal vertebræ; scales large; gill rakers long, slender, 6 + 14; sixth dorsal spine highest; male with a deep depression at the base of anterior anal rays; a gland below middle of the depression; vertebræ 14 + 20 = 34; herbivorous, feeding largely on *Ulva.* ABEONA, 599.

bb. Teeth entire, usually bluntly conic.

c. Scales large, 36 to 50 in lateral line; soft dorsal and anal shortish; size small.

d. Lower lip thin, without frenum; vertebræ 14 + 20 = 34; gill rakers long, slender, 10 + 21; base of anal below 12 caudal vertebræ; central and posterior pharyngeal teeth blunt molars. CYMATOGASTER, 600.

dd. Lower lip thin, with a narrow frenum; vertebræ 34.

e. Head slender and pointed; gill rakers rather slender; body rather elongate, not greatly compressed; dorsal rays VIII, 15. BRACHYISTIUS, 601.

ee. Head rather deep and not pointed; gill rakers thickish; body deep compressed; dorsal rays X, 18. ZALEMBIUS, 602.

cc. Scales comparatively small, 60 to 75 in lateral line.

f. Teeth in each jaw in 2 series; male with 1 of the anterior rays of the anal transformed into a triangular plate, the anal base forming a decided angle at this point, the rays in front of it with a thick covering of skin; pharyngeal teeth mostly small, conic, only a few in the last 2 series enlarged, some of these sometimes truncate molars.

g. Lower lip without a frenum; vertebræ 32 to 35.

h. Gill rakers very long, slender and tapering, 23 to 29; anal basis below 12 to 14 caudal vertebræ; body much compressed.

i. Anal comparatively short, its rays III, 23. HYPOCRITICHTHYS, 603.

ii. Anal long, its rays III, 29 to 32; eye very large; profile depressed above nape. HYPERPROSOPON, 604

hh. Gill rakers moderate, blunt and stout, 6 + 11; anal basis below 11 caudal vertebræ; body less compressed. HOLCONOTUS, 605.

gg. Lower lip attached by a broad frenum; vertebræ 13 + 16; gill rakers short, stout, blunt, 5 + 11; anal basis below 10 caudal vertebræ. AMPHISTICHUS, 606.

ff. Teeth in a single series in each jaw.

j. Dentigerous surface of lower pharyngeal flat or concave.

k. Abdominal vertebræ 13 to 15 only, the abdomen much shorter than the base of the long anal fin; anterior and lateral pharyngeal teeth small, conic, the median and posterior ones large, truncate molars; males with a gland on some of the anterior anal rays, the anal basis without angle, none of the rays modified to form a definite plate.

l. Lower lip thin, normal, entire, with a frenum.

m. Vertebræ 14 + 18 or 19; anal basis below 9 caudal vertebræ; first hæmal spine small, applied to the second. EMBIOTOCA, 607.

mm. Vertebræ 14 or 15 + 21 to 24; anal basis below 11 or more caudal vertebræ; first hæmal spine as long as second, sometimes approximated to the second.

n. Caudal peduncle short and deep; caudal not deeply forked. TÆNIOTOCA, 608.

nn. Caudal peduncle long and slender, little compressed; caudal deeply forked. PHANERODON, 609.

ll. Lower lip without a frenum, very thick, lobed or incised behind; gill rakers long; vertebræ 14 + 22 = 36. RHACOCHILUS, 610.

kk. Abdominal vertebræ 17, caudal 19; abdomen very long, much longer than the base of the short anal fin; lips large, entire, the lower with a frenum; gill rakers slender, short, 7 + 13; anterior and lateral teeth of pharyngeals small, bluntly conic; a triangular posterior patch of larger teeth, all but the posterior row truncate, the posterior row conic. HYPSURUS, 611.

jj. Dentigerous surface of lower pharyngeals arched, the anterior teeth much worn, the posterior not at all; cutting surface of anterior teeth flattened, that of the posterior teeth not faced; teeth of the upper pharyngeals similar to those of the lower pharyngeals, but the posterior teeth of the upper pharyngeal applied to the anterior of the lower pharyngeal (the posterior teeth above resembling the anterior teeth below; the anterior above, the posterior below); lips thin, normal, with a frenum; gill rakers slender. DAMALICHTHYS, 612.

598. HYSTEROCARPUS, Gibbons.

Hysterocarpus, GIBBONS, Daily Placer Times and Transcript, May 18, 1854, and in Proc. Ac. Nat. Sci. Phila. 1854, 124 (*traski*).

Sargosomus (AGASSIZ MS.) ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist. 1861, 128 (*fluviatilis*).

Dacentrus, JORDAN, Bull. U. S. Geol. Surv., IV, 667, 1878 (*lucens*).

Body ovate, the back strongly elevated and convex; head small, the snout projecting; mouth small, with 1 series of rather large, bluntly conical teeth; the jaws about equal; lips not much enlarged, the lower forming a free border, without frenum; gill rakers moderate, widely set; branchiostegals 5; scales rather large, silvery; spinous dorsal very long, of about 16 spines, highest at the fifth or sixth, thence gradually shortened each way, the last spines being shorter than the soft rays; anal spines stronger than in the other genera, curved, the second spine being longer and stronger than the first and third, which are nearly equal; soft rays of anal 20 to 23 in number, the anterior simply articulated. Fresh waters of California; a most remarkable genus, with a single known species. (*ύστερα*, womb; *καρπός*, fruit.)

1879. HYSTEROCARPUS TRASKI, Gibbons.

Head 3⅓; depth 2. D. XVI to XVIII, 11; A. III, 22; lateral line 40. Body oval, compressed; doral outline strongly convex; ventral curve less than that of the back; head small; snout bluntly conic; profile from snout to occiput concave; mouth small, oblique; maxillary not reaching orbit; lower jaw included; lateral line following the curve of the back; dorsal spines rather high, the fourth to seventh highest, the others gradually lower each way, the last spine shorter than the soft rays; anal spines strongly curved; cheeks with 3 rows of large scales. Males above dark brown, sides yellowish or olivaceous, with fine black dots; throat and belly golden yellow; females olivaceous darker above, with black blotches on sides in irregular transverse bars. Rivers of Central California, chiefly in the Sacramento Valley, from Lake County to Santa Clara County; locally abundant. (Named for Dr. J. B. Trask, of San Francisco, who sent specimens to Dr. Gibbons.)

Hysterocarpus traski, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 105, lagoons of the lower Sacramento River (Coll. Dr. J. B. Trask); GIRARD, U. S. Pacific R. R. Survey, X, 190, pl. 26, fig. 14, 1858; GÜNTHER, Cat., IV, 251, 1862; JORDAN & GILBERT, Synopsis, 587, 1883; EIGENMANN & ULREY, Bull. U. S. Fish Comm. 1892, 399.

Sargosomus fluviatilis (AGASSIZ MS.) ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 130, Sacramento River.

Dacentrus lucens, JORDAN, Bull. U. S. Geol. Surv., IV, 667, 1878, Sacramento River; erroneously ascribed to the Rio Grande.

599. ABEONA, Girard.

*Micrometrus**†, GIBBONS, Daily Placer Times and Transcript, May 30, 1854 (*aggregatus* and *minimus*).

Abeona, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 322 (*trowbridgii*=*minimus*).

Body ovate or oblong, compressed; head moderate; mouth small; the jaws about equal; lips rather thin, the lower with a narrow frenum; teeth in one principal series, besides which are often 1 or 2 other teeth, stout, somewhat compressed, and incisor-like; all or most of the teeth 3-lobed; gill rakers very slender, of moderate length; lower pharyngeals scarcely concave behind; the outer teeth small, conic, the rest large molars closely appressed; scales large. Dorsal fin short and high; the spines robust; the middle ones highest and rather higher than the soft rays; anal fin short and deep, below 7 caudal vertebræ, with strong spines; male with a deep depression at base of anterior anal rays, a gland below middle of the depression; vertebræ (*A. minima*) 14 + 20 = 34. Species of small size; partly or wholly herbivorous, living in rock pools and feeding on seaweeds. Coloration variegated. (A coined name without meaning.)

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* Μικρός, small; *μέτρον*, measure.

† Equivalent to *Cymatogaster*, Gibbons, May 18, 1854, including the same species; restricted to *minimus* by Alexander Agassiz, 1861; a restriction perhaps not allowable, as *Micrometrus* was an exact synonym of *Cymatogaster*.

a Dorsal rays IX, 14; anal III, 16; sides with a dusky band, besides dark cross bars and spots. MINIMA, 1880.

aa Dorsal rays IX, 17; anal III, 20; a diffuse lateral shade of orange besides dark dots and shades; a dark axillary blotch. AURORA, 1881.

1880. ABEONA MINIMA (Gibbons).

Head 3¼; depth 2. D. IX, 14; A. III, 16; scales 4–45–12. Body oval, compressed, with thick short caudal peduncle and very short head. Profile moderately depressed above the eyes. Spinous dorsal rapidly rising to the fifth or sixth spine, thence gradually descending; spinous dorsal higher than soft part, the last spine as high as first soft ray; pectorals not reaching as far as ventrals, which reach about to the front of anal; third anal spine not much longer than second; highest dorsal spine equals snout and eye; third anal spine 3 in head; pectoral 1⅙; origin of ventral spine about the width of a scale behind the vertical from pectoral base. Cheeks with scales in 2½ series. Color greenish above with bluish reflections, thickly dusted with black dots; an irregular longitudinal black band along axis of body, and 2 vertical dark bars downward from base of dorsal fin on which they appear as blotches; sides often with much light yellow; axil of pectoral black; ventrals and anal tipped with black. Length 6 inches. San Francisco to San Diego; rather common; the smallest of the family. (*minimus*, smallest.)

Cymatogaster minimus, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 125, San Francisco Bay.
Holconotus trowbridgii, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 152, no locality given.
Abeona trowbridgii, GIRARD, U. S. P. R. R. Surv., x, Fishes, 186, pl. 34, figs. 6–10, 1858.
Abeona minima, JORDAN & GILBERT, Synopsis, 587, 1883; EIGENMANN & ULREY, *l. c.*, 398.

1881. ABEONA AURORA, Jordan & Gilbert.

Head 4; depth 2¾. D. IX, 17; A. III, 20; lateral line 45. Body elongate, with a very long and rather thick caudal peduncle. Head transversely very convex above, and with a blunt snout. Mouth small, oblique; maxillary reaching but ⅔ the distance to front of orbit. Spinous dorsal with the fifth to the ninth spines highest, and about equal to the longest soft ray. Caudal forked for nearly ½ its length. Scales on cheeks in 3 distinct series. Color bluish black above, becoming lighter on sides and silvery below. Opercles and lower ½ of sides punctate with black dots and shaded with light orange, the latter more intense on the centers of the scales and forming a diffuse lateral band; a broad grayish streak backward from pectorals to opposite origin of anal, this streak without orange tint and with the margins of the scales dark by aggregation of black points; young specimens with the bright lateral shade more distinct, and rosy instead of orange; fins marked with more or less blackish, the anal with some yellowish; a conspicuous black triangular blotch in the axil of the pectoral. Length 7 inches. Monterey Bay, California; locally abundant in rock pools; not seen elsewhere; feeds upon *Ulva.* (*aurora,* sunrise.)

Abeona aurora, JORDAN & GILBERT. Proc. U. S. Nat. Mus. 1880, 299, Monterey Bay (Coll. Jordan & Gilbert); JORDAN & GILBERT, Synopsis, 588, 1883.

600. CYMATOGASTER, Gibbons.

Cymatogaster,* GIBBONS, Daily Placer Times and Transcript, May 18, 1854 (*aggregatus* and *minimus*).

Micrometrus, GIBBONS, Proc. Cal. Ac. Sci., in Daily Placer Times and Transcript, May 30, 1854 (*aggregatus* and *minimus*).

Metrogaster (AGASSIZ MS.) ALEXANDER AGASSIZ, Proc. Boston Soc. Nat. Hist., VIII, 1861, 128, and (*aggregatus*).

Sema, JORDAN, Bull. U. S. Geol. Surv., IV, 399, 1878 (*signifer; larvæ* with very high vertical fins and closely compressed body).

Body elliptical, oblong, compressed; head conic; mouth small, oblique, the lower jaw slightly shorter; lips thin, the lower without frenum; teeth small, conical, rather numerous, in 1 series. Gill rakers moderate, slender; scales comparatively large; dorsal spines rather high, some of the middle ones highest, the posterior not so high as the soft rays; the soft dorsal shortened; anal moderate, with weak spines; caudal forked; pharyngeals normal, the teeth mostly conic, the central and posterior teeth molar; vertebræ 14+20=34. Carnivorous species of small size, abounding on sandy or muddy shores. (*κῦμα,* fœtus; *γαστηρ,* belly.)

1882. CYMATOGASTER AGGREGATUS, Gibbons.

(SPARADA; VIVIPAROUS PERCH.)

Head 3⅓; depth 2⅔. D. IX, 20; A. III, 23; scales 3-38-11. Body elongate-oval, compressed, heaviest at the front of the dorsal; caudal peduncle short and slender; head short; teeth very small, conical, $\frac{12}{6}$; dorsal spines high and rather feeble, rising rapidly to the fifth, thence slowly descending, the last lower than the soft rays; pectorals reaching past tips of ventrals, which do not reach nearly to vent; third anal spine the longest, shorter than soft rays; ventral spine situated about 2 scales behind the vertical from the base of the pectoral. Cheeks with 3 rows of scales. Gill rakers short and slender, about 18 below angle. Silvery, back dusky; middle of sides anteriorly with the scales each with a cluster of dark points, these forming a series of longitudinal stripes, which extend to opposite the base of the anal; these stripes are interrupted by 3 vertical light-yellow bars, on which are no black specks in the adult.† Adult males in spring almost entirely black. Length 6 inches. Pacific Coast, from Fort Wrangel, Alaska to Todos Santos Bay, Lower California; everywhere exceedingly abundant in sandy or muddy shallows, and about the wharves. (*aggregatus*, crowded together.)

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* The name *Cymatogaster* was first applied by Dr. Gibbons to 2 species, *aggregatus* and *minimus*. Shortly afterwards Dr. Gibbons transferred the name *Cymatogaster* to *Holconotus*, giving a new name *Micrometrus* to *aggregatus* and *minimus*. Still later, Girard gave the name *Abeona* to *minimus* and Agassiz gave the name *Metrogaster* to *aggregatus*. In 1862 Gill restored the name *Cymatogaster* to *aggregatus*, an arrangement which should probably stand.

†For an excellent detailed account of the development of this species see Eigenmann, Bull. U. S. Fish Comm. for 1892, 412-478.

Cymatogaster aggregatus, GIBBONS, Daily Placer Times and Transcript, May 18, 1854, San Francisco; GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 106; EIGENMANN & ULREY, *l. c.*, 397; EIGENMANN, Bull. U. S. Fish Comm. 1892 (1894), 401.

Micrometrus aggregatus, GIBBONS, Daily Placer Times and Transcript, May 30, 1854; GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 125; JORDAN & GILBERT, Synopsis, 590.

Sema signifer, JORDAN, Bull. Hayden's Geol. Surv., IV, 399, 1878, Rio Grande, Brownsville, Texas; an error, the types having really come from San Francisco.

Metrogaster lineolatus (AGASSIZ MS.), ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 129, San Francisco.

Ditrema aggregatum, GÜNTHER, Cat., IV, 248.

601. BRACHYISTIUS, Gill.

Brachyistius, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 275 (*frenatus*).

Body elongate, compressed, with long caudal peduncle and slender pointed snout; mouth very small, with one row of bluntish teeth; lower lip thin, entire, with a frenum; gill rakers rather slender. Pharyngeals essentially as in *Cymatogaster*. Scales large. Vertical fins very short. Small carnivorous species, living on sandy shores. (*βραχύς*, short; *ἱστίον*, sail, or dorsal fin.)

1883. BRACHYISTIUS FRENATUS, Gill.

Head 3¾; depth 3. D. VIII, 15; A. III, 22; lateral line 40. Body elongate, compressed, regularly elliptical, with a slender pointed head and a long caudal peduncle; profile much depressed over the eyes, the snout projecting. Mouth very small, oblique, maxillary not reaching orbit. Cheeks with 2 rows of scales. Dorsal spines very long and rather strong, the sixth and seventh the longest and a little longer than the soft rays. Caudal rather deeply forked. Gill rakers slender, rather long. Color dark olive brown above, each scale with a dark spot at base, followed by a light mark; below bright light coppery red; each scale with a blue spot and dark punctulations; head colored like the body; fins all light reddish. Length 8 inches. Vancouver Island to Gaudalupe; locally very abundant, especially northward in shallow water. (*frenatus*, bridled.)

Brachyistius frenatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 275, California coast.

Ditrema brevipinne, GÜNTHER, Cat., IV, 248, 1862, Esquimault Harbor, Vancouver Island.

Micrometrus frenatus, JORDAN & GILBERT, Synopsis, 589, 1883.

602. ZALEMBIUS, Jordan & Evermann.

Zalembius, JORDAN & EVERMANN, Check-List, 403, 1896 (*rosaceus*).

This genus agrees in most respects with *Brachyistius*, but the body and head are deep and compressed, the caudal peduncle short, and the vertical fins are longer than in *Brachyistius*. The single species inhabits waters of considerable depth, 50 fathoms or more, being the only member of the family not confined to the shores, most of them living in the surf in very shallow waters. (*ζάλη*, surges of the sea; *ἐμβίος*, life within, the root word of *Embiotoca*.)

1884. ZALEMBIUS ROSACEUS (Jordan & Gilbert).

Head 3⅓; depth 2½. D. X, 18; A. III, 20; scales 6–50–16. Body oblong-ovate, deepest at the shoulders, the profile thence to the occiput convex, the occipital and interorbital region considerably depressed; body tapering backward from the shoulders into a short and slender caudal peduncle. Head small, thick, the snout blunt. Mouth comparatively large, little oblique, the lower jaw included; maxillary slightly passing the vertical from the front of the orbit; premaxillary anteriorly on a level with the inferior margin of the pupil. Eye very large, its diameter about ⅓ the length of the head; interorbital region very broad. Teeth large, conical, truncate at tip, about $\frac{12}{8}$, none on the sides of the lower jaw; gill rakers very short and slender, about 12 below angle. Scales on the cheek in 3 series. Spinous dorsal high, the first spine about ⅖ the length of the highest, the sixth to tenth of nearly equal height, and higher than the soft rays; pectorals reaching past tips of ventrals, which reach about to front of anal; origin of ventral spine nearly below the vertical from the posterior end of pectoral base; anal fin with the base oblique, the spines rather strong, and more or less curved. Caudal fin narrow, forked for more than ½ its length, the lobes rather pointed; pectoral fins small, not reaching to the tips of the ventrals. Color rose-red with silvery luster, darker above; top of head orange; a very distinct chocolate-colored spot above the lateral line at the origin of the soft dorsal fin; another smaller one just below the end of the soft dorsal. Fins immaculate, tinged with reddish. Length 8 inches. Coast of California; the types from deep water outside the Golden Gate; occasionally taken by fishermen with sweep nets, also dredged in deep waters in different places by the *Albatross*. A beautiful and interesting fish. (*rosaceus*, rosy.)

Cymatogaster rosaceus, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 303, off San Francisco. (Coll. Jordan & Gilbert.)

Micrometrus rosaceus, Jordan & Gilbert, Synopsis, 589, 1883.

603. HYPOCRITICHTHYS, Gill.

Hypocritichthys, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 14, 275 (*analis*).

This genus is very close to *Hyperprosopon*, differing chiefly in the short anal fin which has but 23 rays. (ύποκριτής, hypocrite; ἰχϑύς, fish, in form and size resembling *Cymatogaster*, thus belying its affinities which are entirely with *Hyperprosopon*.)

1885. HYPOCRITICHTHYS ANALIS (Alexander Agassiz).

Head 3½; depth 2½. D. IX, 22; A. III, 23; lateral line 63. Body comparatively elongate, formed much as in *Brachyistius frenatus;* upper anterior profile nearly straight, depressed above the eyes; snout sharp; mouth large, very oblique, tip of the lower jaw on a line with the upper profile of the snout; maxillary reaching front of orbit; gill rakers long, numerous; lower lip without frenum; dorsal spines high and slender, longer than soft rays, the middle longest; anal spines small; caudal fin short, not widely forked; pectorals short and broad, ⅘ the length of head; eye $\frac{5}{4}$ length of snout. Color silvery; an inky blotch on the middle of the anal fin, and a fainter blotch on the spinous dorsal; front of anal yellow; fins otherwise plain; axil black. Length 6 inches. San Francisco to Point Conception; rather rare; locally abundant at Santa Cruz. (*analis,* pertaining to the anal.)

Hyperprosopon analis, ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 133, San Francisco.
Hypocritichthys analis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 276.
Ditrema anale, GÜNTHER, Cat., IV, 250.
Holconotus analis, JORDAN & GILBERT, Synopsis, 996.
Hyperprosopon analis, EIGENMANN & ULREY, *l. c.*, 387.

604. HYPERPROSOPON, Gibbons.

(WALL-EYED SURF-FISHES.)

Hyperprosopon, GIBBONS, Daily Placer Times and Transcript, May 18, 1854 (*argenteus*).
Ennichthys, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 322 (*megalops*).
Bramopsis (AGASSIZ MS.) ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 132 (*mento=argenteus*).

Body ovate, strongly compressed; eyes large; mouth small, very oblique, with 2 rows of teeth in each jaw; lower lip without frenum; gill rakers very long, slender and tapering. Pharyngeal teeth mostly small, conic, a few in the last series enlarged or molar; scales small, silvery; male with 1 of the anterior rays of anal transformed into a triangular plate, the fin forming a decided angle at this point, the rays in front of it with a thick covering of skin. Vertebræ 33 to 35, 12 to 14 of them above base of anal. Species of moderate size, living in the surf. (*ὑπέρ*, above; *πρόσωπον*, face, the forehead facing upward.)

a. Ventral fins broadly tipped with black; anal rays III, 33, the fin nearly plain; sides silvery; anterior profile of head concave. ARGENTEUS, 1886.
aa. Ventral fins plain silvery; anal rays III, 30, the fin blackish anteriorly; sides with faint dark cross bands. AGASSIZII, 1887.

1886. HYPERPROSOPON ARGENTEUS, Gibbons.

(WALL-EYED SURF-FISH; WHITE PERCH.)

Head 3½; depth 2¼. D. IX, 27; A. III, 32; scales 72. Body ovate, strongly compressed. Interorbital space rather wide, abruptly depressed at the nape, the profile of the snout extending forward at a less angle than that of the back. Snout very short, much shorter than the eye. Maxillary scarcely reaching front of pupil. Mouth extremely oblique. Eye 2½ in head, larger than in any other species. Gill rakers as long as diameter of pupil and very slender, about 21 below the angle. Middle dorsal spines a little higher than the last, or than the soft rays; anal low; pectorals scarcely reaching to the tips of ventrals, which reach past the front of the anal; origin of ventral spine 5 or 6 scales behind the vertical from posterior end of pectoral base. Color, bluish black above; sides bright silvery, sometimes faintly barred; ventrals with a broad terminal bar of black;

caudal and anal edged with blackish. Length 10 inches. Coast of California, Cape Disappointment to Todos Santos Bay; on sandy shores in the surf, everywhere common. (*argenteus*, silvery.)

Hyperprosopon argenteum, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 105, San Francisco.
Hyperprosopon argenteum punctatum, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 106, San Francisco.
Hyperprosopon arcuatum, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 125, San Francisco.
Holconotus megalops, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 152, Presidio; Humboldt Bay; Astoria.
Ennichthys megalops, GIRARD, U. S. Pacific R. R. Surv., X, Fish., 197, 1858.
Bramopsis mento (AGASSIZ MS.) ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 133, no locality given.
Hyperprosopon argenteus and *arcuatus*, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 276.
Ditrema arcuatum and *Ditrema megalops*, GÜNTHER, Cat., IV, 249.

1887. HYPERPROSOPON AGASSIZII, Gill.

Head 3½; depth 2. D. IX, 25; A. III, 29; lateral line 60. Body elliptic-ovate, the profile nearly straight from the snout to above the occiput, there forming a slight angle, thence straightish to the base of dorsal; ventral outline variable, sometimes strongly arched; mouth small, very oblique, the premaxillary on a level of the middle of the pupil, the maxillary scarcely reaching front of pupil; eye ½ longer than the snout; gill rakers not quite as long as the diameter of the pupil, about 17 on the lower part of arch; 3 rows of scales on cheek; sixth dorsal spine highest, higher than the soft rays; third anal spine much the longest, about ½ as long as first rays; pectorals falcate, reaching the vertical from tip of ventrals, which about reach to vent; origin of ventral spine about 2 scales behind the vertical from posterior end of pectoral base. Length 8 inches. Coast of California, San Francisco to Santa Barbara; not generally abundant; most common along San Luis Obispo County. (Named for Alexander Agassiz, who published in 1861 an excellent review of the species of this family.)

Hyperprosopon arcuatus, ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist. 1861, 125; not of GIBBONS.
Hyperprosopon agassizii, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 276, California.
Amphysticus agassizi, JORDAN & GILBERT, Synopsis, 592.
Hyperprosopon agassizi, EIGENMANN & ULREY, *l. c.*, 387.

605. HOLCONOTUS, Agassiz.

Holconotus, AGASSIZ, Amer. Journ. Sci. Arts, XVII, May, 1854, 367 (*rhodoterus*).
Cymatogaster, GIBBONS, Daily Placer Times and Transcript, June 21, 1854 (not May 18, 1854) (*pulchellus*).

This genus differs from *Amphistichus* chiefly in the absence of a frenum to the lower lip. Vertebræ 14+18=32; gill rakers stout and blunt. Body subelliptical, moderately compressed; anal fin as in *Amphistichus*; its basis below 11 vertebræ. One species. (*ὅλκος*, groove; *νῶτος*, back.)

1888. HOLCONOTUS RHODOTERUS, Agassiz.

Head 3⅔; depth 2. D. IX or X, 26; A. III, 29; lateral line 69. Body deeper, more elevated, and less compressed than in *Hyperprosopon*, form ovate, dorsal and ventral outlines equally curved; profile nearly straight from snout to dorsal, little depressed above eye; snout a little longer than eye; mouth oblique, forming an angle of about 45 degrees; premaxillary on the level of the lower edge of pupil; maxillary not included under preorbital, reaching just past front of pupil; fifth dorsal spine highest, considerably higher than the soft rays; gill rakers 6+11, stout and blunt, fewer and stouter than in *Hyperprosopon.* Color greenish above; sides silvery, profusely covered with spots and blotches of light orange brown or coppery red, these mostly in the form of interrupted vertical bars; caudal, anal, and ventral fins bright reddish, without black spots or markings. Length a foot. Coast of California, San Francisco to San Diego; not very abundant. (*ῥοδότερος*, rosy.)

Holconotus rhodoterus, AGASSIZ, Amer. Journ. Sci. Arts, May, 1854, 368, San Francisco; ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 131; JORDAN & GILBERT, Synopsis, 592; EIGENMANN & ULREY, *l. c.*, 388.
Cymatogaster pulchellus, GIBBONS, Proc. Ac. Nat. Sci. Phila., July, 1854, 123, San Francisco.
Cymatogaster larkinsii, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 123, San Francisco.
Cymatogaster ellipticus, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 124, San Francisco.
Ditrema rhodoterum, GÜNTHER, Cat., iv, 250.

606. AMPHISTICHUS, Agassiz.

Amphistichus, AGASSIZ, Amer. Journ. Sci. Arts, May, 1854, 367 (*argenteus*).
Mytilophagus, GIBBONS, Proc. Ac. Nat. Sci. Phila., July, 1854, 125 (*fasciatus=argenteus*).

Body ovate or oblong, compressed; mouth moderate, oblique, with slender conical teeth in 2 series in each jaw, the outer series longer; lips thin, the lower with a broad frenum; gill rakers few, stout and blunt; pharyngeals normal, their teeth small, conic, a few of the last 2 series larger and molar; fins not very high, the spines slender; scales small; vertebræ 13+16=29; the anal basis below 10 vertebræ. Anal in male with 1 of its anterior rays transformed into a triangular plate; a decided angle at this point, some of the rays before it with the skin thickened. One species. (*ἄμφι*, double; *στίχος*, series.)

1889. AMPHISTICHUS ARGENTEUS, Agassiz.

(SURF-FISH.)

Head 3½; depth 2¼. D. X, 24; A. III, 26; lateral line 65 to 67; vertebræ 13+16=29. Body ovate, the dorsal profile much more curved than ventral; interorbital region scarcely depressed; mouth comparatively large, little oblique, the maxillary being below the level of the rather small eye, lower jaw included. Head blunt and deep; snout longer than the eye; maxillary reaching front of pupil, not included under preorbital; lips rather thin, the lower with a frenum. Gill rakers few, rather short, stiff, 5+11; lower pharyngeals normal. Caudal peduncle short and stout; pectorals reaching slightly past tips of ventrals, which reach to vent; origin of ventral spine almost under posterior end of pectoral base; third anal spine the longest, scarcely ½ as long as first rays; dorsal spines strong, the fifth or sixth longest, shorter than soft rays; pectorals slightly falcate, nearly reaching tips of ventrals. Silvery; sides with narrow vertical bars of a brassy olive color, alternating with vertical series of spots of similar color; fins plain; vertical fins somewhat edged with dusky; specimens occasionally uniform brassy, without bars. Length 1 foot. Pacific coast, from Cape Flattery to San Diego; very abundant on sandy shores. (*argenteus*, silvery.)

Amphistichus argenteus, AGASSIZ, Amer. Journ. Sci. Arts., May, 1854, 367, San Francisco; GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 201.

Mytilophagus fasciatus, GIBBONS, Proc. Ac. Nat. Sci. Phila., July, 1854, 125, San Francisco.

Amphistichus heermanni, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 135, Cape Flattery; San Francisco.

Amphistichus similis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 153, San Francisco.

Ditrema argenteum, GÜNTHER, Cat., IV, 251.

Amphistichus argenteus, JORDAN & GILBERT, Synopsis, 593; EIGENMANN & ULREY, *l. c.*, 389.

607. EMBIOTOCA, Agassiz.

Embiotoca, AGASSIZ, Amer. Journ. Sci. Arts, XVI, November, 1853, 386 (*jacksoni*).

Body oblong, more or less elevated, somewhat compressed, the caudal peduncle robust. Head moderate, the lower jaw included. Lips moderate, the lower with a frenum. Maxillary short, its whole length slipping under the preorbital. Teeth few, conical, bluntish, in 1 series. Gill rakers weak, rather short and slender. Pharyngeals normal, the anterior and lateral teeth small, conic, the median and posterior large, truncate molars; males with a gland on some of the anterior anal rays, but none of them modified to form a definite plate; vertebræ 14 + 18 or 19, the base of anal below 9 caudal vertebræ; first hæmal spine small, applied to the second. Caudal fin lunate; anal fin rather long, much longer than abdomen, its spines small. Scales small, about 60 in the lateral line. One species. This genus is very close to the Japanese genus, *Ditrema*, Temminck & Schlegel, 1847, the longest known member of the family. *Ditrema temminckii* is in form, color, and appearance between *Embiotoca* and *Phanerodon*. Its scales are very small (70 to 75) and the lower pharyngeals are quite small, the teeth all conic and rather slender. (ἔμβιος, living within; τόκος, offspring; an euphonious and appropriate name which is fortunately to be retained.)

1890. EMBIOTOCA JACKSONI, Agassiz.

(COMMON SURF-FISH; BLACK PERCH.)

Head 3¼; depth 2. D. IX or X, 20; A. III, 25; scales 10–58–18. Form ovate, rather thick, the outline convex. Mouth rather small. Gill rakers short and stout, about 15 below angle. Dorsal spines low, much lower than the soft rays; pectoral triangular in outline, not reaching past tips of ventrals, which reach nearly to front of anal; origin of ventral spine about 2 scales behind the vertical from posterior end of base of pectoral; third anal spine less than ¼ as long as first rays; caudal peduncle thickish, the fin not widely forked. Scales on cheeks in 4 series. Brownish, tinged with green, blue, red, or yellowish; sides with about 10 faint, vertical, dusky bars; belly usually yellowish; head with blue spots; fins dusky, tinged with blue or red; anal in males sometimes red with a black patch, and the ventrals orange. Colors extremely variable, the pattern of color not definite. Length 1 foot. Vancouver Island to Todos Santos Bay, generally common; the most abundant of the larger species southward. (Named for A. C. Jackson, of San Francisco, who first noticed the viviparity of *Embiotoca* and first brought the fact to the attention of Professor Agassiz.*)

Embiotoca jacksoni, AGASSIZ, Amer. Journ. Sci. Arts 1853, 387, and 1854, 366, San Francisco; GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 168.
Holconotus fuliginosus, GIBBONS, Proc. Ac. Nat. Sci. Phila. 1854, 123, San Francisco.
Embiotoca cassidyi, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 151, San Diego.
Embiotoca webbi, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 320, San Diego.
Ditrema jacksoni, GÜNTHER, Cat., IV, 245; JORDAN & GILBERT, Synopsis, 595.
Embiotoca jacksoni, EIGENMANN & ULREY, *l. c.*, 392.

608. TÆNIOTOCA, Alexander Agassiz.

Holconotus, GIBBONS, Proc. Ac. Nat. Sci. Phila., July, 1854, 122 (*agassizii=lateralis*).
Tæniotoca, ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 133 (*lateralis*).

This genus is very close to *Phanerodon*, differing only in the short, deep caudal peduncle. The single species is highly variegated in color. (*ταινία*, band; *τόκα*, for *Embiotoca*).

1891. TÆNIOTOCA LATERALIS (Agassiz).

(BLUE PERCH; STRIPED SURF-FISH.)

D. X or XI, 23; A. III, 31; scales 7–63–15; vertebræ 35 to 37. Body oblong, compressed, with a short and very high caudal peduncle, the body tapering back less than usual, the dorsal and ventral outlines nearly equally curved. Mouth but little oblique, the maxillary scarcely reaching orbit. Teeth strong; gill rakers short and stout, about 14 below angle. Spinous dorsal very low, the last spine highest, but much shorter than the soft rays; soft dorsal and anal high; pectoral fins triangular in outline to tips of ventrals, which reach to vent; origin of ventral spine about 2 scales behind the vertical from posterior end of pectoral base; third anal spine less than ½ as long as first rays. Color reddish olive above, becoming bright orange red below, everywhere thickly dusted with black points; a continuous bright blue streak along the edges of each row of scales; streaks of thoracic region formed by isolated blue spots on the middle of the scales; head with several series of blue spots and streaks; fins all olivaceous dusky; ventrals with some light orange. Vancouver Island to San Diego; very abundant northward, scarce south of Point Conception; a very handsome fish. (*lateralis*, pertaining to the side.)

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*The date of Dr. Jackson's discovery is June 7, 1852. Dr. Thomas H. Webb, of the Mexican Boundary Survey, soon after sent a similar notice to Agassiz, an extract from his diary at San Diego, May 3, 1852. Dr. J. K. Lord, of Vancouver Island, and Dr. William Peters Gibbons, of Alameda, made similar observations at about the same time, as did also Prof. George Davidson and Prof. John L. LeConte, the latter apparently in 1851. The earliest published account is that of Agassiz, after notes of Jackson, in November, 1853. After him came Gibbons, in May and June, 1854; Girard, in August, 1854, and others still later. See Eigenmann, Bull. U. S. Fish Comm. 1892, 405, for a full historical account of these discoveries.

Embiotoca lateralis, AGASSIZ, Amer. Journ. Sci. Arts, May, 1854, 356, San Francisco.
*Holconotus** *agassizii*, GIBBONS, Proc. Ac. Nat. Sci. Phila., July, 1854, 122, San Francisco.
Embiotoca lineata, GIRARD, Proc. Ac. Nat. Sci. Phila., August, 1854, 134, San Francisco; Tomales Bay; Presidio.
Embiotoca perspicabilis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 321, Puget Sound.
Embiotoca ornata, GIRARD, Proc. Ac. Nat. Sci. Phila., April, 1855, 321, San Diego; South Farallones.
Tæniotoca lateralis, ALEXANDER AGASSIZ, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 133.
Ditrema laterale, GÜNTHER, Cat., IV, 245; JORDAN & GILBERT, Synopsis, 594.
Phanerodon lateralis, EIGENMANN & ULREY, *l. c.*, 394.

609. PHANERODON, Girard.

Phanerodon, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 153 (*furcatus*).

This genus is very close to *Embiotoca, Ditrema*, and *Tæniotoca*. From *Embiotoca, Phanerodon* differs chiefly in the long and slender caudal peduncle, and in the larger number of vertebræ, 14 or 15 + 23 or 24 = 37 to 39; the base of the anal is below 11 or more vertebræ, and the first hæmal spine is as large as the second; dorsal spines slender and high, the last ones as high as the soft rays. Species plainly colored, of moderate size; the caudal deeply forked. (φανερός, evident; ὀδούς, tooth; but the teeth are no larger than in related genera.)

a. Ventral fins plain whitish; scales of body without orange shades; caudal edged with dusky; head short, 3¾ in length. FURCATUS, 1892.
aa. Ventral fins broadly tipped with blackish; scales of body above each with an orange shade at base; caudal not dusky-edged; head longer, 3½ in length. ATRIPES, 1893.

1892. PHANERODON FURCATUS, Girard.

(WHITE SURF-FISH.)

Head 3¾; depth 2½. D. X, 24 to XI, 22; A. III, 30 to 32; lateral line 66 to 69. Body oblong-elliptical, compressed, tapering backward into the long and slender caudal peduncle; dorsal and ventral outlines about equally curved; occipital region little depressed; mouth small; lower jaw included; teeth rather large, conical; gill rakers very short and slender; last dorsal spine highest, sometimes higher than the soft rays, the fin higher than in *Phanerodon atripes;* pectorals reaching a little beyond tips of ventrals; caudal fin strongly forked, the upper lobe usually the longer. Light olivaceous, silvery below, sometimes yellowish; scales with bright reflections but no red markings; usually a round dusky spot on the anal; ventrals plain; caudal fin edged behind with dusky; fins usually yellowish tinged. Length 1 foot. Pacific coast, from Vancouver Island to San Diego; extremely abundant from Cape Mendocino southward. (*furcatus*, forked.)

Phanerodon furcatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 163, Presidio; Tomales Bay; and in U. S. Pac. R. R. Surv., X, Fish., 184.
Ditrema furcatum, GÜNTHER, Cat., IV, 247; JORDAN & GILBERT, Synopsis, 596.
Phanerodon furcatus, EIGENMANN & ULREY, *l. c.*, 394.

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* The name *Holconotus* was invented by Gibbons independently, and is not synonymous with *Holconotus* of Agassiz.

1893. PHANERODON ATRIPES (Jordan & Gilbert).

Head 3½; depth 2½. D. X, 23; A. III, 29; lateral line 70. Body elongate, tapering into a long and slender caudal peduncle. Snout rather projecting. Head small. Mouth small, the maxillary not extending to opposite the eye. Teeth few and small. Eye as long as snout, 3½ in head. Cheeks with 3 rows of scales. Gill rakers longer than in related species, and pharyngeals stronger, with the teeth more nearly paved. Highest dorsal spine shorter than the soft rays. Pectorals long, reaching tip of ventrals. Caudal lobes equal. Light olivaceous above, pearly below; scales above the axis of body each with an orange spot at base, its outer margin tinged with blue, these forming faint reddish streaks along the rows of scales; anal with a dusky spot; ventrals broadly tipped with blackish; caudal not dark-edged. Length 10 inches. Monterey Bay and banks off San Diego in deeper water than related species; not yet recorded from intervening localities; locally abundant off Monterey. (*ater*, black; *pes*, foot.)

Ditrema atripes, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 320, Monterey Bay; JORDAN & GILBERT, Synopsis, 595.
Ditrema orthonotus, EIGENMANN & EIGENMANN, West American Scientist, October, 1889, 127, Cortes Banks, off San Diego.
Phanerodon atripes, EIGENMANN & ULREY, *l. c.*, 395.

610. RHACOCHILUS, Agassiz.

Rhacochilus, AGASSIZ, Am. Journ. Sci. Arts, May, 1854, 367 (*toxotes*).
Pachylabrus, GIBBONS, Proc. Cal. Ac. Sci., in Daily Placer Times and Transcript, June 21, 1854 (*variegatus* = *toxotes*).

Body ovate, compressed, tapering abruptly into a long and robust caudal peduncle; mouth comparatively large, the lower jaw included; lips extremely thick, the lower without frenum, its posterior edge free, coarsely lobed; teeth few, small, conical, in 1 series; gill rakers rather long; pharyngeals normal; scales small; dorsal spines low, posteriorly subequal, much shorter than the soft rays; caudal deeply forked; anal basis elongate, the spines small. Vertebræ 14+22. One species. Males with a gland on some of the anterior rays; the anal basis without angle; none of the rays modified to form a plate. (*ῥάκος*, rag; *χεῖλος*, lip.)

1894. RHACOCHILUS TOXOTES, Agassiz.

(ALFIONE.)

Head 3⅗; depth 2⅖. D. X, 23; A. III, 30; scales 11–76–20. Body ovate, with elevated back and long, thick caudal peduncle; head deep, with prominent snout; mouth wide, oblique, the lower jaw included; maxillary reaching front of orbit, slipping under the preorbital; lips extremely large, with uneven surface, slashed behind and without frenum; teeth strong, wide-set, those in mandible little developed; eye large; gill rakers stout, about 20 below the arch; about 6 series of scales on cheek, 8 on opercle; soft dorsal considerably elevated, much higher than spinous portion; pectorals and ventrals long; pectoral triangular in outline, about reaching to tips of ventrals, which reach past vent; origin of ventral spine about 6 scales behind the vertical from posterior edge of pectoral base. Caudal short, deeply forked, the upper lobe the longer. Olivaceous, with brassy reflections and dusky points; fins plain. Length 18 inches. The largest and least handsome of the family, and the one of most value as food. Coast of California, from San Francisco to San Diego, rather common. (*τοξότης*, the East Indian archer fish; from some obscure resemblance.)

Rhacochilus toxotes, Agassiz, Am. Journ. Sci. Arts, May, 1854, 367, San Francisco; Girard, U. S. Pac. R. R. Surv., x, Fishes, 188, 1858.

Pachylabrus variegatus, Gibbons, Proc. Ac. Nat. Sci. Phila., vii, July, 1854, 126, San Francisco.

Ditrema toxotes, Günther, Cat. Fishes, iv, 247.

Rhacochilus toxotes, Jordan & Gilbert, Synopsis, 596; Eigenmann & Ulrey, *l. c.*, 390.

611. HYPSURUS, Alexander Agassiz.

Hypsurus, Alexander Agassiz, Proc. Bost. Soc. Nat. Hist., viii, 1861, 133 (*caryi*).

Body oblong, compressed, moderately elevated, tapering abruptly to a very slender and short peduncle. Head moderate, rather acute, lower jaw included. Lips rather large, entire, the lower with a frenum. Teeth few, conical, blunt, in 1 series, those of the upper jaw sometimes partly in 2 series. Gill rakers slender, rather short. Pharyngeals normal; anterior and lateral teeth of lower pharyngeals small, bluntly conic; a triangular posterior patch of larger teeth, all but the posterior row truncate, the posterior row conic. Dorsal fin rather low, the spines all lower than the soft rays. Caudal broad and short, widely forked. Anal fin extremely short, although many-rayed, beginning far back, the length of its base being less than ½ the distance between its first spine and the root of the ventrals, the abdomen being therefore extremely long. Scales rather small. Vertebræ 17 + 20. This genus is distinguished from *Embiotoca* chiefly by the great length of the abdominal region which is caused by the increased number of abdominal vertebræ. One species, of small size and brilliant coloration. (*ὕψι*, high; *οὐρά*, tail.)

1895. HYPSURUS CARYI (Agassiz).

(Bugara.)

Head 3½; depth 2½. D. X or XI, 23; A. III, 24; lateral line 71. Body elliptical, compressed, the ventral outline comparatively straight; head depressed above eye; snout sharp; premaxillaries on the level of the lower margin of pupil, lower jaw included; maxillary nearly reaching front of eye, included under preorbital; fourth to sixth dorsal spines highest, lower than the soft rays; gill rakers slender, short, 7+13. Pectoral long, reaching past tips of ventrals, which reach ½ way from their base to front of anal; origin of ventral spine about 8 scales behind the vertical from the posterior end of pectoral base. Anal very short, the third spine longest, about ¼ as long as the first rays, far back, its rays slender and crowded close together, its origin opposite posterior third of dorsal. Coloration extremely variegated, olivaceous, with stripes of orange between the rows of scales; about 13 dusky orange cross bars, irregular in form; eyes reddish, surrounded by a sky-blue band; membranes of opercles chiefly orange; opercle bluish, spotted with orange; sides of head with sky-blue spots; lower jaw with orange and blue stripes; breast and belly with longitudinal stripes of bright orange, alternating with steel blue; abdominal furrow orange, edged with blue; pectoral with an orange crescent at base bordered with light blue; soft dorsal with a black blotch near the front; caudal of a peculiar rich orange brown, with cross bars formed of round grayish spots; anal chiefly orange tipped with blue, and with a large blackish blotch; other fins orange brown, mottled. Length 10 inches. Coast of California; very common from Cape Mendocino to San Diego; a beautiful fish, largely used for bait; very rare south of Point Conception, common off San Francisco. (Named for its discoverer, Mr. Thomas G. Cary, brother of Mrs. Agassiz.)

Embiotoca caryi, Agassiz, Amer. Journ. Sci. Arts 1853, 389, and 1854, 366, San Francisco.
Holconotus gibbonsii (Gibbons MS., Proc. Cal. Ac. Sci. 1854), Gibbons, Proc. Ac. Nat. Sci. Phila. 1854, 12, San Francisco.
Hypsurus caryi, Alexander Agassiz, Bost. Journ. Nat. Hist., viii, 1861, 133; Jordan & Gilbert, Synopsis, 593; Eigenmann & Ulrey, *l. c.*, 384.
Ditrema caryi, Günther, Cat., iv, 247, 1862.

612. DAMALICHTHYS, Girard.

Damalichthys, Girard, Proc. Ac. Nat. Sci. Phila. 1855, 321 (*vacca* = *argyrosomus*).

Body ovate, compressed, with long caudal peduncle; head rather large; mouth moderate, the lower jaw included; lips full, the lower with a frenum; teeth very few, short, conical, bluntish, in 1 series; gill rakers short and slender; lower pharyngeal very large, convex behind in outline, with the lateral horns very short and thick; anterior tooth-bearing area on the plane of the bone; posterior area inclined backward, forming a steep angle with the anterior part; teeth on anterior part low, truncate, hexagonal, tessellated; on posterior part ovate, flattened, imbricated, and turned forward so that the posterior side forms the grinding edge; posterior teeth of upper pharyngeals applied to anterior of the lower pharyngeal; the posterior teeth above similar to the anterior below, and vice versa; scales rather small; dorsal spines low, much shorter than the soft rays; anal fin long, with small spines. Vertebræ 13 + 21. Species of large size, plainly colored, externally resembling *Ditrema* and *Phanerodon*, but singularly distinguished from all the other members of the family by the peculiar pharyngeals. (*δάμαλις*, calf; *ἰχθύς*, fish; in allusion to its viviparity.)

1896. DAMALICHTHYS ARGYROSOMUS (Girard).

(White Perch; Porgee.)

Head 3⅓; depth 2⅓. D. X, 23; A. III, 29; scales 8-63-17. Form broadly elliptical, the dorsal curve regular, similar to the ventral curve; caudal peduncle rather slender; head rather large, not blunt; occipital region little depressed; premaxillary just below the level of the pupil; the maxillary scarcely reaching front of the eye, lower jaw included; lips thickish, even; eye large, a little longer than snout; cheeks with 3 or 4 rows of scales. Gill rakers 7 + 13, not ¼ so long as the large eye, which is longer than snout. Teeth very few, short and blunt. Dorsal spines stoutish, the last one highest, ½ the height of the soft rays. Caudal deeply forked, the upper lobe the longer; pectoral long, reaching beyond front of anal; ventrals reaching nearly to anal; origin of ventral spine about 4 scales behind the vertical from posterior part of pectoral base; third anal spine nearly ½ as long as first rays. Color soiled white, with silvery luster; 3 or 4 obscure dusky bars, most distinct in the young; fins nearly plain, dusky. Length 15 inches. Pacific coast, Vancouver Island to San Diego; everywhere common, especially northward; the most abundant species on the coast of British Columbia, entering the inlets in thousands; the flesh rather poor and tasteless. (*ἄργυρος*, silver; *σῶμα*, body; but this species lacks the silvery sheen of *Hyperprosopon*.)

Embiotoca argyrosoma, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 136, San Francisco (young individual in bad condition); and in U. S. Pac. R. R. Surv., X, Fishes, 180, 1858.

Damalichthys vacca, GIRARD, Proc. Ac. Nat. Sci. Phila. 1855, 321, Puget Sound; and in U. S. Pac. R. R. Surv., X, Fishes, 182, 1858.

Ditrema vacca, GÜNTHER, Cat. Fishes, IV, 246, 1862.

Damalichthys argyrosoma, JORDAN & GILBERT, Synopsis, 597; EIGENMANN & ULREY, *l. c.*, 385.

NOTE.—For the sake of completeness, we add the two remaining known species and genera of *Embiotocidæ*, from Japan.

DITREMA, Temminck & Schlegel.

Ditrema, TEMMINCK & SCHLEGEL, Fauna Japanica, Poiss., 77, pl. 40, fig. 2, 1847 (*temminckii*).

This genus is very close to *Embiotoca*, differing in its smaller scales and in its pharyngeal teeth, which are all conic and slender, the bones quite small. Coloration of *Phanerodon*. (*δίς*, two; *τρῆμα*, aperture, the generative organs having a distinct opening from the intestines.)

DITREMA TEMMINCKII, Bleeker.

Head 3¾; depth 2⅓. D. X, 21; A. III, 25; scales 8–70–14; eye 3½ in head; pectoral 1$\frac{1}{10}$; ventral 2; last dorsal spine 3½; second dorsal ray 2½; longest anal ray 3½; caudal 1⅖. Body ovate compressed, the nape somewhat produced, upper profile of head about straight; ventral outline more strongly curved than dorsal; mouth small, the maxillary reaching to nostrils; lower jaw slightly included; teeth conical, blunt, in a single series, on the front of lower jaw only; length of snout equals diameter of eye; nostrils small, close together; gill rakers short and slender; about 4 rows of scales on cheek; top of head from posterior margin of eye, snout, ventrals, mandibles, and edge of preopercle naked; scales below lateral line on middle of body the largest, their depth greater than their length; fins naked; dorsal with a scaly sheath. Pectorals reaching about to vent, fin pointed behind, the upper rays the longest; ventrals nearly their length behind base of pectorals, their ends not reaching to tip of pectorals; dorsal spines much shorter than the soft rays, the last the longest; soft dorsal highest in front; anal spines very small, the third the longest, much shorter than the soft rays; caudal widely forked. Color silvery, steel blue on back; angle of preopercle with a dark spot; a dark blotch on upper end of opercle; dorsals dusky, darker at ends of rays; anal dusky; tips of ventrals black; axil of pectoral dusky, the fin white; caudal blackish at base, tips black. Described from a specimen 8 inches in length, collected in Japan by Mr. Keinosuke Otaki. (Named for C. J. Temminck, one of the authors of the splendid Fauna Japanica.)

Ditrema temminckii, BLEEKER, Verh. Bat. Genootsch., XXV, Japan, 33; GÜNTHER, Cat., IV, 246, 1862.
Ditrema læve, GÜNTHER, Cat., II, 392, 1860, Japan.

NEODITREMA, Steindachner.

Neoditrema, STEINDACHNER, Beitr. Kenntn. Fische Japans, II, 32, 1883 (*ransonnetii*).

This genus is allied to *Ditrema*, but lacks teeth in the jaws, and the lower lip is without frenum. Scales very small, deciduous, 70 in lateral line. Japan. (*νεός*, new; *Ditrema*.)

NEODITREMA RANSONNETII, Steindachner.

Head $3\frac{2}{3}$ to $3\frac{3}{4}$; depth $3\frac{1}{3}$. D. VI to VIII–21 or 22; A. III, 26 or 27; eye $3\frac{2}{5}$ in head; interobital 4; snout 4. Body strongly compressed, especially the belly under the pectorals; anterior profile more or less concave; under lip projecting, thin, not interrupted in the middle; maxillary reaching to below anterior edge of orbit. Anal spines short; caudal forked, as long as head; ventrals equal head without snout. Scales cycloid, 3 or 4 rows on cheek; top of head, maxillary, lips, and orbitals naked; a few scales on soft dorsal and anal; pharyngeals as in *Ditrema*. Back to lateral line dark golden brown, under parts golden yellow; the middle of caudal fin is light yellow, at its base and end of fin dark brownish violet. Two specimens in the museum at Vienna, from Yokohama; a larger specimen collected by Dr. Döderlein, 170 mm. long. (Steindachner.)

Neoditrema ransonnetii, STEINDACHNER, Beiträge zur Kenntniss der Fische Japans, II, 32, 1883, Yokohama. (Coll. Baron Ransonnet and Dr. Döderlein.)

Suborder CHROMIDES.

Lower pharyngeals fully united; nostril single on each side; in other respects similar to the *Percoidea* on the one hand, and to the *Pharyngognathi* on the other, showing characters of both, with the unique feature of the simple nostrils. Species very numerous, referable to 2 large families—the one marine, living about coral reefs, the other fluviatile, swarming in the rivers of the tropics, especially in those of South America.

a. Anal spines 3 to 10; gills 4, a slit behind the fourth; pseudobranchiæ obsolete; vertebræ in increased number; fresh water species. CICHLIDÆ, CLVIII.
aa. Anal spines 2 only; gills $3\frac{1}{2}$, slit behind fourth small or none; pseudobranchiæ well developed; vertebræ 24 or 25; marine species. POMACENTRIDÆ, CLIX.

Family CLVIII. CICHLIDÆ.

(The Cichlids.)

Body elevated, oblong or elongate, covered with moderate-sized scales, which are usually ctenoid; lateral line interrupted, usually ceasing opposite the posterior part of the dorsal, and then recommencing lower down on the caudal peduncle; mouth varying in size, terminal, the jaws with rather small teeth, which are usually conical, but sometimes lobate or incisor-like; no teeth on vomer or palatines; nostril single on each side; premaxillaries freely protractile; maxillary slipping under the broad preorbital; gill rakers various; gill membranes often connected; dorsal fin single, with the spinous portion well developed, usually but not always longer than the soft portion; anal fin with 3 or more spines, the soft part similar to the soft dorsal; ventral fins thoracic, I, 5; lower pharyngeal bones united into a triangular piece, with a median suture; branchiostegals 5 or 6; no pseudobranchiæ; gills 4, a slit behind the fourth; vertebræ in more or less increased number, about 28 to 40; air bladder present. A large family of fresh-water fishes of moderate or small size, representing, as to form, size, appearançe, and habits, and even as to many details of structure, in the waters of South America, the *Centrarchidæ* of the United States. Genera about 40; species about 150, inhabiting the rivers of Africa and tropical America, the genus *Heros* extending into the limits of the United States. Those with lobate teeth are herbivorous, the rest carnivorous. The species here enumerated are but the overflow of the vast river fauna of South America. (*Chromides*, Günther, Cat., IV, 264–316.)

- *a.* Outer gill arch normal, without additional lobe above; spinous portion of dorsal fin not shorter than soft portion; gill rakers short and few; vertical limb of preopercle entire; scales of lateral line not enlarged.
  - *b.* Teeth all conic.
    - *c.* Premaxillary very greatly protractile; anal spines 6; snout not longer than postorbital part of head; preorbital narrow. PETENIA, 613.
    - *cc.* Premaxillary moderately protractile; ventrals inserted behind origin of dorsal.
      - *d.* Jaws subequal.
        - *e.* Anal spines 3.
          - *f.* Soft portion of dorsal and anal naked or scaled at base only; caudal scaled on basal half; lower jaw without distinct canines; lower lip with a frenum. ÆQUIDENS, 614.
        - *ee.* Anal spines more than 3 (4 to 11), some of the teeth usually enlarged, often canine-like.
          - *g.* Lower lip with a frenum, its fold interrupted mesially. CICHLASOMA, 615.
          - *gg.* Lower lip without frenum, forming a free fold for its whole extent. HEROS, 616.
      - *dd.* Jaws unequal, the lower jaw included; anal spines 4 or 5; cleft of mouth short; scales on cheeks small. THERAPS, 617.
  - *bb.* Teeth not all conic, a series of incisors in front, with a band of villiform teeth behind them; anal spines 8. NEETROPLUS, 618.
- *aa.* Outer gill arch with a compressed lamelliform lobe above.
  - *h.* Eye behind middle of head; soft dorsal entirely scaleless; fold of lower lip interrupted in front; dorsal spines 13 to 15; anal spines 3; scales on cheeks small. SATANOPERCA, 619.

613. PETENIA, Günther.

Petenia, GÜNTHER, Cat. Fishes, IV, 301, 1862 (*splendida*).

Premaxillary extremely protractile; snout long, but not longer than postorbital part of head; preorbital narrow; mouth oblique, the premaxillary on the level of lower third of eye; maxillary reaching front margin of eye; teeth all conical; gill rakers short and few; preopercle entire; scales large, those of the lateral line not enlarged. Ventral inserted below front of dorsal. Anal spines 6. Species 3, of Central America, Colombia, and northern Brazil. (Name from Lake Peten, Guatemala, the original locality of *Petenia splendida.*)

1897. PETENIA SPLENDIDA, Günther.

Head $2\frac{2}{3}$; depth 3. B. 5; D. XV, 12; A. V, 10; scales 6–41–17. Head longer than high; snout compressed, triangular; lower jaw very prominent; jaws extremely protractile, so that the snout is not much shorter than head when jaws are protracted; processes of intermaxillaries extending backward to nape of neck; length of mandibles $\frac{3}{4}$ that of head. The greater portion of maxillary not covered by preorbital, and extending beyond vertical from center of orbit; each jaw armed with a band of villiform teeth, the outer series containing rather larger conical teeth; preorbital narrower than orbit, the diameter of which is $\frac{1}{6}$ or $\frac{1}{7}$ length of head; interorbital space very convex, as wide as, or wider than, orbit. Gill membranes united below throat, and not attached to isthmus; first branchial arch with 13 anterior prominences. Dorsal fin commencing at vertical from root of pectoral, its spines of moderate length and strength, increasing in length to the seventh which is $\frac{2}{9}$ that of head; posterior spines a little longer than middle ones; soft dorsal and anal rather elevated, extending to, or nearly to, root of caudal; anal spines strong, $\frac{2}{7}$ length of head; caudal rounded, its length rather more than $\frac{1}{6}$ of total; free portion of tail longer than high; pectoral extending to first anal spine, the ventral to vent; distance of vent from ventral nearly $\frac{1}{2}$ length of head. Scales on cheek in about 7 series. Greenish, shining golden; head, body, and vertical fins with black dots; a series of 6 or 7 large round black spots along middle of side, the last spot edged with white and situated on upper half of root of caudal. Length 16 inches. Lake Peten, Guatemala. (Günther.) (*splendidus*, shining.)

Petenia splendida, GÜNTHER, Cat. Fishes, IV, 301, 1862, Lake Peten, Guatemala (Coll. Salvin); GÜNTHER, Fish. Centr. Am., 469, pl. 79, fig. 2, 1869.

614. ÆQUIDENS, Eigenmann & Bray.

Æquidens, EIGENMANN & BRAY, Ann. Ac. Sci. N. Y. 1894, 616 (*tetramerus*).

This genus includes those species allied to *Astronotus*, which have 3 anal spines, the soft dorsal and anal naked or scaled at base only, no canine teeth, and the lower lip without frenum. Rivers of South America; the species rather numerous. (*æquus*, equal; *dens*, tooth).

1898. **ÆQUIDENS CŒRULEOPUNCTATUS** (Kner & Steindachner).

Head rather more than 3; depth 2½. D. XV, 10; A. III, 8; scales 2½–27–9. Greatest breadth of head ⅔ its length. Nape curved, profile of snout straight. Width of interorbital space ⅖ length of head, and more than that of snout. Snout broad, moderately elevated; width of preorbital scarcely more than diameter of eye. Cleft of mouth slightly oblique, not reaching vertical from orbit. Fold of lower lip interrupted in middle. Lower limb of preoperculum more than ½ length of posterior limb. Only 8 series of scales between throat and root of ventral. Dorsal spines of moderate strength, gradually increasing in length posteriorly, length of ninth more than ⅓ that of head; middle of soft dorsal and anal produced and extending beyond middle of caudal, which is rounded; pectoral as long as head, reaching only to origin of anal; ventral filament rather long. Three series of scales on cheek. Body with 4 or 5 indistinct cross bands; a large black blotch on middle of sides, and traces of a second on root of caudal; each scale on side of head and chest with a bluish spot. Length 5 inches. Rio Chagres, Atlantic slope of the Isthmus of Panama. (Kner & Steindachner.) (*cœruleus*, blue; *punctatus*, dotted.)

Acara cœruleopunctata, KNER & STEINDACHNER, Sitz. bayer. Akad., 222, 1863, Rio Chagres, Isthmus of Panama (Coll. Salvin); KNER & STEINDACHNER, Abhandl. bayer. Akad. Wiss., X, tab. 2, fig. 3, 1864; GÜNTHER, Fish. Centr. Am., 449, 1869.

615. CICHLASOMA, Swainson.

Cichlasoma, SWAINSON, Nat. Hist. Class'n Fishes, etc., II, 230, 1839 (*punctatus*=*bimaculatus*).
Archocentrus, GILL, Proc. Ac. Nat. Sci. Phila. 1877, 186 (*centrarchus*).

This genus contains those species allied to *Astronotus*, which have 4 to 11 spines in the anal fin, the dorsal and anal not closely scaled and the lower lip interrupted mesially to form a frenum. Species very numerous, chiefly South American. (*Cichla*, a related genus; σῶμα, body; κίχλη, a thrush; the name *Cichla* and its synonyms, *Turdus* and *Merula*, transferred by early authors to Labroid fishes.) The following analysis of species has little value. A natural arrangement will be possible only after a detailed comparison of the various forms:

CICHLASOMA:
a. Anal fin moderate, its spines 4 to 9 in number.
b. Anal spines 4; body rather slender; sides with a broad, dark lateral band. Dorsal rays XVI, 13. RECTANGULARE, 1899.
bb. Anal spines 5, occasionally 6.
c. Dorsal rays mostly XVI or XVII, 11 or 12.
d. Depth less than ½ length of body.
BARTONI; GODMANNI; SIEBOLDI; INTERMEDIUM; ANGULIFERUM, 1900–1904.
dd. Depth about ½ length of body.
FENESTRATUM; MONTEZUMA, 1905; 1906.
cc. Dorsal rays XIV or XV, 12 or 13; depth of body 1½ in its length.
MACRACANTHUM, 1907.
bbb. Anal spines 6 to 8, rarely 5 or 9.
e. Depth of body about ½ its length.
PARMA; MARGARITIFERUM; SPILURUM; LONGIMANUS; BIFASCIATUM; HELLERI, 1908–1913.

ee. Depth of body less than $\frac{1}{2}$ its length, $2\frac{1}{3}$ to 3 in length.
BALTEATUM; ROSTRATUM; MELANOPOGON; MELANURUM; NEBULIFERUM; LENTIGINOSUM; DEPPII, 1914–1920.

ARCHOCENTRUS (ἄρχος, anus; κέντρον, spine):
- *aa.* Anal fin very long, its spines 10 or 11 in number; depth about $\frac{1}{2}$ length.
  - *f.* Anal fin with 7 soft rays. NIGROFASCIATUM; MULTISPINOSUM, 1921; 1922.
  - *ff.* Anal fin with 9 soft rays. CENTRARCHUS, 1923.

Subgenus CICHLASOMA.

1899. CICHLASOMA RECTANGULARE (Steindachner).

Head $3\frac{1}{4}$; depth $2\frac{2}{9}$. D. XVI, 13; A. IV, 11; scales 33–21; eye $4\frac{2}{5}$ in head, 2 in snout; 7 series of scales on cheek. Lower lip interrupted; outer teeth large, somewhat canine-like, their tips brown; maxillary reaching front of eye; premaxillary moderately protractile; profile depressed before eye, which is in the middle of length of head; back considerably arched; suborbital deep, $1\frac{1}{3}$ times eye. Dorsal spines rather low and strong; soft dorsal and anal moderately high and pointed; ventrals longer than pectoral, $3\frac{2}{3}$ in head; anal spines graduated; soft dorsal and anal with small scales at base; caudal rounded. Color dark brown; a narrow brown vertical streak on each scale posteriorly; a broad blackish band beginning behind the eye, running backward along the body to opposite first soft ray of anal, then turning abruptly upward to base of dorsal, forming a right angle; a large black blotch at base of caudal; soft dorsal, anal, and caudal with alternate rows of yellow and dirty blue spots on the membranes. Fins mostly bluish, dotted with black. Length $7\frac{1}{2}$ inches. Mexico. (Steindachner.) Not seen by us. (*rectangularis*, right-angled.)

Acara rectangularis, STEINDACHNER, Chromiden Mejicos, 1, 1864, Mexico.

1900. CICHLASOMA BARTONI (Bean).

Head $2\frac{3}{4}$; depth $2\frac{1}{3}$. D. XIV, 11; A. IV, 9; eye $4\frac{1}{2}$ to $5\frac{1}{2}$ in head, or 2 in snout; interorbital width $1\frac{1}{2}$ in snout; scales 5–34–11. Larger examples with nape strongly arched. Mouth very oblique; lower jaw projecting, maxilla not reaching vertical from front of eye. Length of upper jaw $\frac{2}{5}$ that of head. Teeth in jaws; frenum of lower jaw distinct (in type specimens) in bands, outer series much enlarged and brown at tips; head of vomer much enlarged, but toothless; palate without teeth. Scales on cheek in about 6 series. The dorsal beginning over gill opening, first spine very short, second somewhat longer, length of spines gradually increasing backward, last and longest one nearly $\frac{1}{3}$ length of head; longest soft rays (third and fourth) nearly $\frac{1}{2}$ as long as head; spines of dorsal rather slender; anal origin nearly under beginning of soft dorsal; fourth anal spine nearly $\frac{1}{3}$ as long as head; longest anal ray (fourth) more than $\frac{1}{2}$ as long as head; least depth of tail equals length of snout; middle caudal rays slightly longer than longest anal ray; pectoral nearly reaching to above origin of anal, and ventral reaching to vent; lateral line interrupted under fourth soft ray of dorsal and begins on median line of tail at a distance below upper line a little greater than diameter of eye. Color purplish brown; from head to tail a broad dark band, more or less broken up into separate blotches, the last of which is very distinct at base of tail;

fins dusky. In a specimen about 5 inches long the cheeks and snout profusely covered with minute roundish brown dots. Four specimens, 3½ to 7 inches long, collected in Hauzteca Potosina, a region situated north of Guanajuato, in San Luis Potosi, Mexico. (Bean.) (Named for Barton A. Bean, assistant curator of ichthyology in the United States National Museum, a conscientious naturalist.)

Acara bartoni, T. H. BEAN, Proc. U. S. Nat. Mus. 1892, 286, Hauzteca Potosina, San Luis Potosi, Mexico. (Type, No. 43765. Coll. Alfredo Dugès.)

1901. CICHLASOMA GODMANNI (Günther).

Head 3 to 3⅓; depth 2¾. D. XVI or XVII, 13 or 12; A. V, 9; scales 5-33-13. Head as high as long; snout rather elevated: preorbital wider than orbit; profile of nape much curved; cleft of mouth rather narrow, horizontal; jaws equal anteriorly; maxillary not extending backward to vertical from front margin of eye; the 6 front teeth of outer series the longest, deep brown; nape elevated; orbit considerably below upper profile of head; opercles scaly. Dorsal and anal fins very slightly scaly at base; spinous dorsal low, length of twelfth spine ¼ that of head: soft dorsal and anal somewhat produced, extending beyond root of caudal; free portion of tail somewhat higher than long: caudal subtruncated, ⅕ total length; pectoral shorter than head, but rather longer than ventral, which does not extend to vent. Head grayish olive; cheeks and body reddish olive; an irregular blackish band proceeding from above pectoral to a black spot in middle of root of caudal; a black spot above origin of lateral band; opercles, back, and vertical fins with black dots. Length 7 inches. Guatemala. (Günther.) (Named for its discoverer, Mr. Godman.)

Heros godmanni, GÜNTHER, Cat. Fishes, IV, 296. 1862, Rio de Cahabon, Guatemala (Coll. Godman & Salvin); GÜNTHER, Fishes Centr. Am., 466. pl. 74. fig. 5, 1869.

1902. CICHLASOMA SIEBOLDII (Kner & Steindachner).

Head 3; depth 2⅗: eye 4 to 5 in head. D. XVII, 11; A. V, 8; scales 33. Body oblong, the back not much elevated; the head bluntly and evenly convex; cleft of mouth terminal, not very low, as long as eye; lip rather vague, its folds interrupted; 10 or 12 teeth in outer row in each jaw, these larger than in most related species, somewhat compressed, and with deep brown tips; 5 rows of scales on cheek; preorbital as broad as eye. Dorsal spines rather low, the soft rays somewhat pointed; caudal rounded; pectoral short, 1⅓ in head; ventral about the same. Clear brown, somewhat darker above; middle of each scale with a small blackish spot, these forming a dusky line along each row of scales; about 8 dusky crossbars formed of 2 or 3 vague, partially confluent dusky shades, the lowest of these shades above level of pectoral, forming an obscure row of blotches from gill opening to base of caudal; dorsal, anal, and caudal with distinct dusky spots arranged in cross rows; paired fins with black specks but not spotted; some black spots on sides of head. Length 5 to 8 inches. Known from 11 specimens from New Grenada and from the west slope of the peninsula of Panama. (Kner & Steindachner.) This fish is probably not sufficiently distinct from *C. godmanni*. (Günther.) (Named for Professor von Siebold, of Vienna, author of a work on the Fishes of Austria.)

Heros sieboldii, KNER & STEINDACHNER, Abhandl. bayer. Akad. Wiss., X, 13, 1864, pl. 2, fig. 2, New Grenada; GÜNTHER, Fish. Centr. Am., 466, 1869.

1903. CICHLASOMA INTERMEDIUM (Günther).

Head 3¼; depth 2⅗. D. XVII or XVIII, 11; A. V or VI, 10 or 8; scales 5–32–13. Head as high as long; preorbital rather wider than orbit; eye not very remote from profile of nape, which is curved; cleft of mouth rather narrow, horizontal; jaws equal anteriorly. Base of soft dorsal and anal with scarcely any scales; dorsal spines of moderate length and strength, length of twelfth ⅓ or nearly ⅓ that of head; soft dorsal and anal extending slightly beyond root of caudal; free portion of tail not quite so long as high; caudal subtruncated, its length ⅕ of total; pectoral shorter than head, but rather longer than ventral, which extends nearly to vent. Fold of lower lip interrupted in middle; 5 or 6 series of scales on cheek. Brownish, lower parts red in adults; a broad angular brown band on trunk, its horizontal branch extending from gill opening to vertical from first anal spine, while its vertical branch ascends to hinder dorsal spines; each scale within this band with a black vertical streak; a rather narrow brown band running from angular band to a blackish spot at root of caudal; vertical fins with whitish ocelli, inclosed by reddish streaks. Length 6 inches. Lake Peten. (Günther.) (*intermedius*, intermediate.)

Heros intermedius, GÜNTHER, Cat. Fishes, IV, 298, 1862, Lake Peten (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 468, pl. 78, fig. 1, 1869.

1904. CICHLASOMA ANGULIFERUM (Günther).

Head 3⅓; depth 2½. D. XVII or XVIII, 10; A. V, 8; scales 4–33–12. Head as high as long; preorbital scarcely wider than orbit; eye not very remote from profile of nape, which is slightly curved; cleft of mouth rather narrow, horizontal; jaws equal anteriorily; maxillary not extending backward to vertical from front margin of eye. Dorsal and anal fins not scaly; dorsal spines of moderate length and strength, length of twelfth ⅓ that of head; soft dorsal and anal extending to root of caudal; free portion of tail as long as high; caudal subtruncated, its length not quite ⅕ total; pectoral shorter than head, but longer than ventral, which does not extend to vent. Fold of lower lip interrupted in middle; 4 series of scales on cheek. Brownish olive, with a broad angular black band on trunk, its horizontal branch extending from eye to vertical from first anal spine, its vertical branch ascending to hinder dorsal spines; some scales within the band and on opercles with a black dot; a round blackish blotch on root of caudal fin. Length 4 inches. Guatemala. (Günther.) (*angulus*, angle; *fero*, I bear.)

Heros angulifer, GÜNTHER, Cat. Fishes, IV, 298, 1862, Yzabal, Guatemala (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 469, pl. 85, fig. 1, 1869.

1905. CICHLASOMA FENESTRATUM (Günther).

Head 3; depth 2. D. XVI or XVII, 12; A. V or VI, 9; scales 14–33–13. Vertebræ 14+15. Head as high as long; snout of moderate extent, slightly elevated, the preorbital somewhat wider than orbit; cleft of mouth small, horizontal, jaws equal anteriorly; eye below upper profile, nearer to extremity of snout than to that of operculum; interorbital space convex, wider than orbit. Vertical fins very slightly scaly at base; dorsal spines moderately strong, length of twelfth ⅗ that of head; the soft dorsal and anal pointed, their points not extending to middle of caudal; caudal rounded; distance between dorsal and caudal less than greatest depth of free portion of tail; pectoral shorter than head; ventral pointed. Fold of lower lip interrupted in middle; 5 series of scales on cheek. Brownish green, with 6 dark cross bands, less distinct in old individuals than in young ones, crossing a deep-black longitudinal band which runs from above pectoral to middle of root of caudal; vertical and ventral fins blackish, darkest at base and margins. Length 6 inches. Rivers of southern Mexico. (*fenestratus,* with window-like or lattice-like markings.)

Chromis fenestrata, GÜNTHER, Proc. Zool. Soc. Lond. 1860, 318, Rio de la Lana, Mexico. (Coll. M. Sallé.)
Heros fenestratus, GÜNTHER, Cat., IV, 286, 1862.

1906. CICHLASOMA MONTEZUMA (Heckel).

D. XVI, 11; A. V, — ; lateral line 30. Fold of lower lip interrupted in middle; 5 series of scales on cheek. Body with 6 dark cross bands, the last around root of caudal and marked with a black spot. (Heckel.) Mexico. A scarcely known species. (Montezuma, the last king of the Aztecs.)

Heros montezuma, HECKEL, Brasil. Fluss-Fische, 383, 1840, Mexico; GÜNTHER, Cat., IV, 296, 1862.

1907. CICHLASOMA MACRACANTHUM (Günther).

Head 3; depth 1½. D. XIV or XV, 12 or 13; A. V, 9 or 10; scales 5½–31–15. Head rather higher than long, nape convex, but upper profile showing a slight concavity above snout. Snout of rather considerable extent, height of preorbital ½ more than width of orbit; cleft of mouth slightly oblique, preorbital almost covering posterior end of maxillary, which does not attain line of front margin of eye; jaws rather protractile, armed with a broad band of villiform teeth, those of outer series enlarged; interorbital space convex, nearly twice width of orbit; eye somewhat nearer to end of operculum than to that of snout; base of soft dorsal and anal with a few small scales; dorsal and anal spines strong; first dorsal spine a little before vertical from upper end of gill opening; twelfth dorsal spine a little less than ½ length of head in adults, fifteenth longest, and more than ½ length of head; soft dorsal and anal much elevated, middle rays produced; caudal rounded; pectoral rounded, about as long as head; first ventral ray slightly prolonged; free portion of tail nearly twice as deep as long. Lower lip interrupted in middle. Scales on cheek in 5 series. Greenish or brownish olive; fins black; a more or less distinct black spot on root of caudal fin, above lateral line. Immature individuals with 6 very indistinct dark cross bands, the third of which has a blackish blotch below lateral line; an indistinct blackish spot at root of caudal fin. Length 9 inches. Chiapas and Huamuchal. (Günther.) (*μακρός*, large; *ἄκανθα*, spine.)

Hero macracanthus, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 153, Chiapas and Huamuchal; GÜNTHER, Fishes Centr. Am., 451, 1869.

1908. CICHLASOMA PARMA (Günther).

Head 3; depth 2. D. XVII, 12 or 13; A. VI, 9 or 10; scales 5–31–13. Head rather higher than long, with the nape very convex in adults; snout of moderate extent, compressed, more or less elevated, much longer than eye; cleft of mouth slightly oblique, jaws equal anteriorly, and maxillary hidden below preorbital, not extending to below front margin of orbit. Jaws rather protractile, armed with a broad band of villiform teeth, the teeth of the outer series being enlarged; preorbital wider than orbit; interorbital space very convex, wider than orbit; eye nearly in middle of length of head; base of soft dorsal and anal with a few small scales; dorsal spines of moderate length and strength, length of twelfth rather less than ½ that of head in adults, and exactly ½ in young ones; soft dorsal and anal elevated; caudal rounded; pectoral rounded, not much shorter than head; outer ventral ray prolonged, less so in young individuals; fold of lower lip interrupted in middle; 5 or 6 series of scales on cheek. Brownish or greenish olive, with 7 very indistinct dark cross bands. The specimens from Guatemala have a large black blotch on middle of root of caudal. Fins dark brown in the adult, lighter in the young, and with a few scattered dark dots. Length 9 inches. Mexico and Guatemala. (Günther.) (*parma*, a shield.)

Heros parma, GÜNTHER, Cat. Fishes, IV, 285, 1862, Mexico and Guatemala; GÜNTHER, Fishes Centr. Am., 449, 1869.

1909. CICHLASOMA MARGARITIFERUM (Günther).

Head 3; depth nearly 2. D. XVII, 11; A. VII, 9; Scales 5–31–13. Head rather higher than long; a fleshy hump on nape, which is probably a character of mature age; snout compressed, rather high, of moderate extent, its length contained 2¼ in that of head; preorbital much wider than orbit, the diameter of which is ½ length of snout; cleft of mouth slightly oblique, with lower jaw a little prominent beyond upper; maxillary hidden below preorbital, not extending to front margin of eye; jaws protractile, armed with a broadish band of villiform teeth, those of the outer series the larger; eye nearer to extremity of operculum than to that of snout; scales on cheek not much smaller than those on opercles; a few small scales at base of soft portions of vertical fins. Dorsal spines of moderate strength and length, length of twelfth contained 2⅓ in that of head; soft dorsal and anal somewhat elevated in middle, extending to base of caudal; free portion of tail as long as high; caudal fin slightly emarginate, with lobes rounded, ⅕ total length; pectoral shorter than head, extending to third anal spine; outer ventral ray produced into a short filament. Fold of lower lip slightly interrupted in middle; 5 or 6 series of scales on cheek. Brownish olive, with 7 black cross bands; the first in front of dorsal fin; second to fifth below spinous dorsal, partly extending on fin; the sixth below end of dorsal; the seventh across free portion of tail; each of these cross bands has numerous pearl-colored spots; root of caudal with a blackish spot. Length 6½ inches. Guatemala. (*margarita, μαργαρίτης*, pearl; *fero*, I bear.)

Heros margaritifer, GÜNTHER, Cat. Fishes, IV, 287, 1862, Lake Peten, Guatemala (Coll. Godman & Salvin); GÜNTHER, Fishes Centr. Am., 450, pl. 71, fig. 2, 1869.

1910. CICHLASOMA SPILURUM (Günther).

Head nearly 3; depth 2. D. XVIII, 10; A. VIII or IX, 7 or 8; scales 4½–29–11. Head a little higher than long; snout of moderate extent, its length ⅖ that of head; diameter of eye 2/7 length of head, ⅔ that of snout, and less than width of interorbital space, which is convex; eye situated below upper profile, a little nearer to extremity of operculum than to that of snout; preorbital as wide as orbit; cleft of mouth very narrow, scarcely oblique, with jaws equal anteriorly; opercles scaly; vertical fins scaly at base; dorsal spines of moderate length and strength, length of twelfth contained 2⅓ in that of head; points of soft dorsal and anal extending to middle of caudal; caudal rounded; distance between dorsal and caudal less than depth of tail; pectoral nearly as long as head, extending to fourth anal spine; outer ventral ray prolonged into a short filament. Fold of lower lip interrupted in middle; 4 series of scales on cheek. Greenish olive, with 9 dark ventral bands; a large roundish black spot on middle of root of caudal; no spot on temple; caudal and posterior part of dorsal and anal with whitish spots. Length 3½ inches. Rio Montagua, Guatemala. (Günther.) (*σπῖλος*, spot; *ὀυρά*, tail.)

Heros spilurus, GÜNTHER, Cat. Fishes, IV, 289, 1862, Rio Montagua, Guatemala (Coll. Salvin); GÜNTHER, Fishes Centr. Am., 451, pl. 73, fig. 1, 1869.

1911. CICHLASOMA LONGIMANUS (Günther).

Head 2⅗; depth 2⅙. D. XVI, 10; A. VI, 8; scales 4½–28–12. Head rather longer than high; cleft of mouth slightly oblique, with lower jaw prominent; upper profile of head straight; jaws moderately protractile; maxillary not extending to vertical from front margin of eye; preorbital as wide as diameter of eye, which is somewhat less than width of interorbital space, and more than ¼ length of head; eye immediately beneath upper profile of head, and a little nearer to end of operculum than to that of snout; dorsal commencing vertically above scapula, the spinous portion having its upper margin convex, spines slender and long, fifth and sixth the longest, ½ length of head; soft dorsal and anal having middle rays somewhat longer than others, and reaching to about middle of caudal; soft anal slightly scaly at base, soft dorsal scarcely or not at all scaly; anal spines shorter but somewhat stronger than those of dorsal; caudal slightly emarginate; pectoral very long, slightly longer than head, and extending nearly to end of anal; ventral with outer ray produced into a filament; distance between vent and root of ventrals ⅛ length of head. Teeth in jaws small, cardiform, forming a band, those of outer series somewhat larger than others; fold of lower lip interrupted in middle; scales on cheek in 3 or 4 series; scales on opercles large. Greenish olive, with an indistinct blackish band running from orbit to a large black spot on middle of side; dorsal fin with numerous round whitish spots. Length 5½ inches. Lake Nicaragua. (Günther.) (*longus*, long; *manus*, hand.)

Heros longimanus, GÜNTHER, Fish. Centr. Am., 453, pl. 72, fig. 2, 1869, Lake Nicaragua. (Coll. Capt. Dow.)

1912. CICHLASOMA BIFASCIATUM (Steindachner).

Head 3⅓; depth 2⅛. D. XVII, 13; A. VI, 9; scales 35–20. Body oval, moderately compressed, the back regularly arched; head bluntish; eye 5 in head; 5 or 6 rows of scales on cheeks; preorbital broad, nearly twice eye; mouth small, upper lip thickish; lower thin, disappearing anteriorly; teeth rather strong; ventrals pointed, 4¼ in length; pectoral 4; dorsal spines rather strong; soft dorsal and anal pointed; caudal rounded. Color reddish yellow; naked parts of head violet blue; 2 broad black longitudinal bands along sides of body, the upper ending at last ray of soft dorsal, the lower running from angle of opercle to base of caudal, the upper band broadest; ventrals yellowish gray, other fins dark brown with round dark-blue spots on the membranes of the soft rays. Length 9½ inches. Mexico. (Steindachner.) (*bifasciatus*, two-banded.)

Heros bifasciatus, STEINDACHNER, Chromiden Mejicos, 4, 1864, Mexico.

1913. CICHLASOMA HELLERI (Steindachner).

Head 3; depth 2; eye 3½ in head. D. XIV to XVI, 10 to 12; A. VI to VIII, 8 or 9; scales 5–31 or 32–14. Body short and deep, compressed, the back elevated, the snout sharp and low, the profile depressed before eye; 4 or 5 rows of scales on cheeks. Outer teeth long and slender, pectoral long, reaching sixth anal spine, about as long as head; ventral longer than head, reaching last anal spine; spines high; soft dorsal and anal pointed; caudal lunate. Color brownish, with 5 or 6 faint cross bands; on the upper half of the third cross band a large jet-black blotch where it crosses a dark lengthwise stripe from upper edge of gill opening to base of caudal; a round dark blotch on subopercle; cheeks usually with large blue points; dorsal and anal with dark-blue spots; caudal brownish, unspotted, but with dark specks; a narrow dark cross band at base of caudal. Length 5½ inches. Rio Teapa, Tabasco, Mexico. (Steindachner.) (Named for its discoverer, Prof. Karl Heller.)

Heros helleri, STEINDACHNER, Chromiden Mejicos, 8, 1864, Rio Teapa, Tabasco, Mexico.

1914. CICHLASOMA BALTEATUM (Gill & Bransford).

Depth rather more than 2½. D. XVIII, 10; A. VII, 7. Head abbreviated and snout convex above and almost subtruncated in front; caudal peduncle little higher than long, and gradually diminishing to tail; length of snout 2½ times in that of head; interorbital area flat; preoperculum mostly vertical, but convexly protuberant at angle; buccal scales in 5 rows; jaws normally developed; supramaxillary terminating at a vertical in front of orbit; lower lip indicated by an obsolete fold, wanting toward symphysis; teeth in outer row moderately enlarged; dorsal fin slightly developed; anterior spines rather slowly graduated, and the rest subequal; longest soft rays, when bent back, extending to terminal half of caudal; anal fin commencing under about fourteenth dorsal spine; spines at first rapidly and then gradually increasing in length backward; longest soft rays, when bent back, reaching second third of caudal fin; caudal fin 4⅓ times in extreme length, and slightly emarginated; pectoral fins reaching backward to vertical of third anal spine, and filamentary rays of ventral fins extending to fourth or fifth anal spine. Back declining rather slowly, and in a gentle curve to tail, and in front of dorsal boldly decurved to forehead. Color (in spirits) yellowish orange; a rather broad black band extending from postocular region across operculum and shoulder, along flanks to spot at base of caudal fin; back in front of dorsal with a blackish spot, and under base of dorsal fin are more or less defined dark areas or spots; dorsal fin dusky and immaculate, as are also the anal and caudal; pectoral fins yellowish at base and dusky beyond, and the ventral has outer rays dusky (but with edge of external lighter) and inner yellowish; branchiostegal membrane below orange or yellowish, and the breast slate-colored. Lake Nicaragua. (Gill & Bransford.) (*balteatus*, belted.)

Heros balteatus, GILL & BRANSFORD, Proc. Ac. Nat. Sci. Phila. 1877, 184, Lake Nicaragua.

1915. CICHLASOMA ROSTRATUM (Gill & Bransford).

Depth 2⅓; caudal peduncle ⅓ higher at base than long. Its greatest height bears to its length the ratio of 10 to 8. Head acutely pointed, and snout above rectilinear. Length of snout exceeds ½ that of head. Interorbital area nearly flat. Preoperculum and cheeks very oblique. Buccal scales in 6 rows. Jaws normally developed. Superior maxillary terminates at a vertical a little nearer eye than snout, and the articulation of lower jaw is notably in advance of eye. Lips moderately developed, and lower one separated by a broad frenum at middle. Dorsal fin well developed; anterior spines rapidly graduated, the rest subequal; the soft rays, when bent back, extend a little beyond basal third of caudal. Anal fin commencing under about twelfth dorsal spine, its first 4 spines rapidly increase, and its last 2 moderately; soft part, when bent back, extending a little beyond basal fourth of caudal. Caudal enters 4⅓ times in extreme length, and is subtruncate, but slightly emarginated in middle. Pectoral fins well developed and extending about as far backward as first anal rays. Ventral fins have filamentary rays, which extend backward to last anal spine. Back declines rather rapidly to tail, and in front of dorsal is slightly gibbous. Color a bronzed olive, indistinctly crossed, at least in the young, by 2 bands, 1 under dorsal and the other below its last rays; later these fade out more or less, leaving of the first only a rather indistinct dorsal saddle under median spines, and of the second a distinct black spot below lateral line; a black spot also at base of caudal fin, mostly above lateral line; breast and lower surface of head bronzed or blackish toward maturity; dorsal at its spinous part dusky and immaculate, but in its soft portion diversified by dusky areas in 3 or 5 rows. separated by narrow light interspaces; anal more nearly uniform, but still has a few light spots; caudal reticulated by bright interspaces on a dusky ground; pectorals spotless; ventrals dusky. Lake Nicaragua. (Gill & Bransford.) Fin rays not described. The species is said to be closely related to *Heros affinis*, which has D. XVI, 8 or 9; A. VIII or IX, 8 or 7. (*rostratus*, long-nosed.)

Heros rostratus, GILL & BRANSFORD, Proc. Ac. Nat. Sci. Phila. 1877, 181, Lake Nicaragua.

1916. CICHLASOMA MELANOPOGON (Steindachner).

Head $3\frac{1}{5}$; depth $2\frac{1}{4}$. D. XVI or XVII, 12; A. VI, 9; scales $6\frac{1}{2}$–30–13; eye 4 in head; pectoral 4 in body. Fold of lower lip interrupted in middle; 5 or 6 series of scales on cheek. Color reddish brown, with 4 black blotches along base of dorsal; another row of black blotches along side behind pectoral reaching base of caudal; lower fins with spots of mother-of-pearl, which also extend on the black blotches; 2 black cross streaks on forehead. Length $4\frac{1}{2}$ inches. Central America. (Steindachner.) (*μέλας*, black; *πώγων*, beard.)

Heros melanopogon, STEINDACHNER, Chromiden Mejicos, 16, in Denkschr. Akad. Wiss. Wien, XXIII, 1864, 72, taf. 1, fig. 3, Central America; GÜNTHER, Fish. Centr. Am., 450, 1869.

1917. CICHLASOMA MELANURUM (Günther).

Head nearly 3; depth $2\frac{1}{3}$ to $2\frac{1}{2}$. D. XVII, 11; A. VI, 8; scales 5–33–13. Head higher than long; a fleshy hump on nape in large individuals; snout compressed, rather high, of moderate extent, its length $\frac{2}{5}$ or $\frac{1}{3}$ that of head. Preorbital wider than orbit; cleft of mouth oblique, lower jaw scarcely prominent; maxillary not extending to vertical from front margin of eye; jaws protractile, armed with a broad band of villiform teeth, those of outer series the larger, and brown at tip. Eye as distant from extremity of snout as from that of operculum. Scales on cheek considerably smaller than those on opercles. Vertical fins scaleless. Dorsal spines of moderate strength and length, the length of twelfth $\frac{1}{3}$ that of head; soft dorsal and anal extending somewhat beyond root of caudal; free portion of tail nearly as long as high; anal spines strong and long; caudal rounded, $\frac{1}{5}$ total length; pectoral shorter than head, extending nearly to origin of anal fin; distance of vent from root of ventral $\frac{3}{4}$ length of head. Fold of lower lip subinterrupted in middle;* 5 series of scales on cheek. Orange colored or purplish brown, with a more or less irregular deep-black band along middle of tail; sometimes a series of more or less confluent black blotches on back. Mature individuals having whole of lower parts of head, belly, and tail deep black; dorsal, caudal, and pectoral orange colored or purplish brown, with a few scattered spots posteriorly; anal and ventral black. Young examples have no black, except the band on tail; their dorsal spines proportionally longer, length of twelfth contained 2¼ in that of head. Length 10 inches. Guatemala. (Günther.) (*μέλας*, black; *οὐρά*, tail.)

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* The fold is distinctly interrupted in specimens from 6 to 10 inches long, while it appears to be slightly continuous in young individuals of 3 to 4 inches in length.

Heros melanurus, GÜNTHER, Cat. Fishes, 228, 1862, Lake Peten, Guatemala. (Coll. Godman & Salvin.)

1918. CICHLASOMA NEBULIFERUM (Günther).

Head 4; depth 2⅔. D. XVIII, 12; A. VI, 9; scales 6–35–13. Head as high as long; snout slightly elevated, preorbital wider than orbit. Profile of nape much curved. Cleft of mouth small, horizontal; jaws equal anteriorly; interorbital space convex, its width equal to 1½ diameter of eye; opercles scaly. Dorsal and anal fins very slightly scaly at base, spines of the former of moderate strength, length of twelfth somewhat less than ½ that of head. Soft dorsal and anal not produced, and the former not extending to root of caudal; caudal truncated; free portion of tail longer than high; pectoral shorter than head; ventral not prolonged. Fold of lower lip interrupted in middle; 6 series of scales on cheek. Greenish olive; middle of body clouded with blackish, in the form of indistinct vertical bands; a round black spot in middle of root of caudal; the outer parts of fins blackish. Length 7 inches. Mexico. (Günther.) (*nebula* cloud; *fero*, I bear.)

Chromis nebulifer, GÜNTHER, Proc. Zool. Soc. Lond. 1860, 318, Mexico (Coll. M. Sallé); GÜNTHER, Cat. Fishes, IV, 297, 1862.

1919. CICHLASOMA LENTIGINOSUM (Steindachner).

Head 3⅓; depth 2¾. D. XVII, 13; A. VI, 9; scales 34–20. Body comparatively elongate, compressed; the back arched, profile depressed before eye; the snout prominent, bluntish, sharp in the young. Anterior teeth considerably enlarged. Eye rather behind middle of head, 5 in head; 6 rows of scales on cheek. Preopercle rather broad. Ventrals rounded, rather short, not reaching vent; pectoral longer, 4 in head; spines moderate; soft dorsal and anal pointed; caudal lunate. Olivaceous, yellowish below, base of each scale paler; 6 or 7 faint curved dark cross bands; sides of head and sides of body everywhere with small irregular scattered brown specks, these especially numerous on opercles; soft dorsal, anal and caudal with crossrows of dark spots; spinous dorsal with 3 faint dark lengthwise streaks. Length 8½ inches. Mexico. (Steindachner.) (*lentiginosus*, warty.)

Heros lentiginosus, STEINDACHNER, Chromiden Mejicos, 6, 1864, Mexico.

1920. CICHLASOMA DEPPII (Heckel).

Head 3¾; depth 3. D. XVII, 10; A. VI, 8; lateral line 30–17. Fold of lower lip interrupted in the middle. Six rows of scales on cheek. The length of the dorsal spines is ¼ that of head. Brownish; tail with 6 obsolete dark cross bands, the last with a black spot. (Heckel.) Mexico; a scarcely known species. (Named for Mr. Depp.)

Heros deppii, HECKEL, Brasil. Fluss-Fische, 382, 1840, Mexico; GÜNTHER, Cat., IV, 296, 1862.

Subgenus ARCHOCENTRUS, Gill.

1921. CICHLASOMA NIGROFASCIATUM (Günther).

Head 3; depth 2⅙. D. XVIII, 8; A. X, 7; scales 4–29–11. Head as high as long, with upper profile convex to snout, where it is straight. Snout of moderate extent; width of preorbital equal to that of orbit; eye somewhat nearer to end of snout than to that of operculum, its diameter considerably less than width of interorbital space, and ¼ length of head; jaws equal in length. Soft dorsal and anal fins with scarcely any scales on their bases, and more or less produced in middle, the longest rays reaching to middle of caudal; dorsal fin commencing in vertical from humerus, its spines of moderate strength, rather short, length of twelfth somewhat less than ⅓ that of head; anal spines as long as, but rather stronger than, those of dorsal fin; caudal rounded, 2/9 total length; pectoral as long as head without snout, extending to second or third anal spine; ventral but slightly produced. Lower lip interrupted in middle. Scales on cheek in 4 or 5 series. Very dark-colored; ground color a dark blackish-purplish brown; an arched black band running from nape round opercular margin to operculum; a second nearly concentric with first, running from nape to behind pectoral and ventral; third short, like a spot between anterior dorsal spines and lateral line; the following subvertical, slightly inclined backward, and broader than interspaces between them; the penultimate connecting ends of dorsal and anal fins; the last across root of caudal; fins black. Length 3½ inches. Nicaragua; known from Lakes Atitlan, Amatitlan, and Nicaragua. (Günther.) (*niger*, black; *fasciatus*, banded.)

Heros nigrofasciatus, GÜNTHER, Fish. Centr. Am., 452, pl. 74, fig. 3, 1869, Lake Atitlan, Nicaragua. (Coll. Salvin.)

1922. CICHLASOMA MULTISPINOSUM (Günther).

Head 3; depth 2⅐. D. XVIII, 9; A. XI, 7; scales 4–29–12. Head as deep as long, with upper profile nearly straight; snout rather short; width of preorbital considerably less than that of orbit; eye situated immediately below upper profile, nearer to end of snout than to that of operculum; its diameter a little less than ⅓ length of head, and much less than width of interorbital space, which is flat; mouth with jaws equal in length, small, the maxillary not reaching vertical from orbit. Suboperculum with 2 series of scales; soft dorsal and anal fins scaly at base, scarcely prolonged, and not extending to middle of caudal; dorsal fin commencing above humerus, its spines of moderate strength, and rather long, length of eighth to last spine being not much less than ½ that of head; anal spines stronger, and even a little longer than those of dorsal; caudal fin rounded, 2/9 of total length; pectoral shorter than head, extending to fifth anal spine; outer ventral ray produced into a short filament; free portion of tail twice as deep as long. Lower lip interrupted in middle. Three series of scales on cheek. Brownish olive, each scale somewhat darker at base; a blackish band, as broad as a scale, running from eye to a round black spot situated before and below termination of upper part of lateral line;

thence it is continued to root of caudal as a series of 4 or 5 irregular spots; fins blackish, apparently immaculate. Length 3½ inches. Lake Managua, Guatemala. (Günther.) (*multum*, many; *spinosus*, spined.)

Heros multispinosus, GÜNTHER, Fish. Centr. Am., 453, pl. 74, fig. 2, 1869, Lake Managua, Guatemala. (Coll. Capt. Dow.)

1923. CICHLASOMA CENTRARCHUS (Gill & Bransford).

Depth 2. D. XVI, 8; A. X, 9. Caudal peduncle very short, its height at root being twice as great as it is long, and it comparatively rapidly narrows to caudal: head having forehead slightly gibbous, and snout rectilinear and pointed in front; length of snout little more than ¼ that of head; interorbital area slightly raised; preoperculum nearly vertical and at angle boldly rounded; buccal scales in 5 rows; jaws normally developed; supramaxillary terminating at a vertical about a pupil's length in advance of eye; lips moderately developed, the lower interrupted in front; teeth of outer row rather strong; dorsal fin moderately developed; dorsal spines increase in a regular, bold curve from first to sixth, and the following nearly equal; longest rays, bent backward, extend for length of basal half of caudal; anal fin very long and commences under ninth dorsal spine; spinous portion not much less than 3 times longer than soft; first 3 spines rapidly graduated and following ones nearly equal; longest soft rays reaching backward to terminal half of caudal; caudal fin forms ¼ of extreme length, its angles round and the posterior margin slightly emarginated; pectoral fin extending backward nearly to vertical of fifth or sixth anal spine; ventral fins also reaching to nearly same point; parts above and below longitudinal axis nearly equally balanced; back declines moderately in a curve toward tail and in front of dorsal slightly, but regularly decurved toward forehead. Color bronze olive, with 7 indistinct cross bands; at base of tail a faint spot, chiefly above lateral line; fins dusky and immaculate. Lake Nicaragua. (Gill & Bransford.) (*Centrarchus*, a genus of North American sunfishes, with many anal spines; κέντρον, spine; ἄρχος, anus.)

Heros centrarchus, GILL & BRANSFORD, Proc. Ac. Nat. Sci. Phila. 1877, 185, Lake Nicaragua, Nicaragua.

616. HEROS, Heckel.

Heros, HECKEL, Ann. Wiener. Mus. 1840, 362 (*severus*, etc.; restricted by Jordan & Gilbert to *severus*).

Herichthys, BAIRD & GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 25 (*cyanoguttatus*).

Hoplarchus, KAUP, Wiegmann's Archiv 1860, 129 (*pentacanthus*).

Body oblong, compressed, somewhat elevated, the form Centrarchoid. Head rather large, scaly on the cheeks and opercles; preopercle entire. Mouth rather small, terminal, low, moderately protractile, the jaws subequal, lower lip without frenum, its fold being continuous; maxillary small; preorbital deep; jaws with a single series of rather stout conical teeth, behind which, in front, is a narrow band of villiform teeth. Gill membranes slightly connected, free from the isthmus; gill rakers short and thick. Scales rather large, ctenoid, the lateral line interrupted and beginning again below, as usual in this family. Dorsal fin continuous, the spinous part much longer than the soft part, of about 17 rather low but strong spines; soft rays much higher than spines; anal fin similar to soft dorsal but shorter, its spinous part also longer than the soft, of 4 to 10 spines; vertical fins not closely scaled; caudal fin subtruncate, with rounded angles. This genus as here understood differs from *Cichlasoma* in the absence of frenum to the lower lip; the anal spines are numerous (4 to 10), the mouth not greatly protractile, and the dorsal and anal fins not closely scaled. The characters separating *Cichlasoma*, *Heros*, *Æquidens*, and *Astronotus* are not of great importance, and may be not wholly natural. Recent authors have united all under one generic name, *Astronotus*.* It seems to us, however, more convenient to recognize these groups as distinct genera, as a help toward the orderly arrangement of the great mass of species usually referred to *Heros*. Even as thus restricted, *Heros* is a very large genus, taking in the rivers of South America the place filled in North America by *Lepomis* and related genera. Species very numerous, chiefly South American. The species of this genus have never been critically compared. (ἥρως, hero, the allusion not evident.) The following analysis will be found artificial and of little value:

a. Anal spines 8 or 9 (rarely 7).
  b. Dorsal rays XVIII, 9 or 10; scales 31. FRIEDRICHSTHALI, 1924.
  bb. Dorsal rays XVII, 10; scales 29. SALVINI, 1925.
  bbb. Dorsal rays XVI, 8 or 9; scales 29. AFFINIS, 1926.
  bbbb. Dorsal rays XVI, 11 or 12; scales 30. MACULIPINNIS, 1927.
aa. Anal spines 7 (rarely 6 or 8).
  c. Body comparatively deep, the depth ½ the length; soft fins elevated. TRIMACULATUS, 1928.
  cc. Body oblong, the depth 2⅓ to 2½ in the length.
    d. Dorsal with 17 (rarely 16 or 18 or 19) spines and 11 or 12 soft rays.
      e. Males with the lips greatly thickened and vertically expanded; scales 32. LABIATUS, LOBOCHILUS, 1929, 1930.
      ee. Males with the lips not greatly thickened nor expanded. ERYTHRÆUS, BASILARIS, NICARAGUENSIS, MANAGUENSIS, 1931–1934.
    dd. Dorsal with 16 spines and but 9 or 10 soft rays; scales 33; head 3 in length. AUREUS, 1935.
  ccc. Body rather deep, the depth 2⅕ in length; dorsal rays XVI or XVII, 12. CITRINELLUS, 1936.
  cccc. Body comparatively elongate, the depth 3 in length; dorsal rays XVIII, 18. MOTAGUENSIS, 1937.
aaa. Anal spines 6 (rarely 5 or 7).
  f. Dorsal rays XVIII, 11 to 14.
    g. Body rather elongate, the depth 3 in length; scales 33 to 35. OBLONGUS, DOVII, 1938, 1939.
    gg. Body rather deep, the depth 2⅓ in length; scales 34. GIBBICEPS, MICROPHTHALMUS, 1940, 1941.
  ff. Dorsal rays XVI or XVII, 10, rarely 11; depth 2⅙ to 2⅕ in length; a dark spot at base of caudal.
    h. Caudal spot ocellate; no blue spots; scales 29. UROPHTHALMUS, 1942.
    hh. Caudal spot diffuse.
      i. Body banded with dark; no blue spots; scales 33. TROSCHELI, 1943.
      ii. Body and fins with many small blue spots; scales 25. CYANOGUTTATUS, 1944.

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* *Astronotus*, Swainson, 1839 (*ocellatus*) = *Acara*, Heckel, 1840, as restricted by Gill, 1858 = *Hygrogonus*, Günther, 1862.

aaaa. Anal spines 5, rarely or never 6; dorsal rays XVI, 11 or 12.
  j. Body rather elongate, the depth $2\frac{2}{3}$ in length; scales 32. PAVONACEUS, 1945.
  jj. Body moderately deep, the depth $2\frac{2}{5}$ in length; body with cross bands and pearly dots. ALTIFRONS, 1946.
  jjj. Body deep, the depth $2\frac{1}{7}$ in length; scales 30; coloration nearly plain, the fins with dark spots. BEANI, 1947.
aaaaa. Anal spines normally 4 (very rarely 5). Dorsal rays XV or XVI, 10 to 12; body rather deep, compressed, the depth $2\frac{1}{2}$ in length; body and fins with dark-brown spots. TETRACANTHUS, 1948.

1924. HEROS FRIEDRICHSTHALI, Heckel.

Head $2\frac{3}{5}$; depth $2\frac{1}{2}$; eye $3\frac{5}{6}$ in head, equal to snout. D. XVIII, 9 or 10; A. VIII or IX, 9 or 7; scales 4–31–12. Fold of lower lip continuous in middle. Scales on cheek in 7 series. Antero-inferior margin of preorbital concave, the greatest width of this bone only $\frac{1}{2}$ that of orbit. Length of twelfth dorsal spine $\frac{2}{7}$ that of head. Longest dorsal ray $1\frac{1}{4}$ in head; longest anal ray $1\frac{1}{2}$ in head. Yellowish olive, with 6 or 7 blackish cross bands;* a black band from eye to upper part of root of caudal, interrupted by the interspaces between cross bands, the origin and end of this band are edged with yellow; suboperculum with a black ocellus; an oblique black streak from eye toward ocellus. Length 5 inches. Lake Peten, Lake Nicaragua, and its outlet, the Rio San Juan.

Heros friedrichsthali, HECKEL, Flussfische Brasil, 381, 1840, Rio San Juan, Nicaragua; GÜNTHER, Cat. Fishes, IV, 294, 1862; GÜNTHER, Fish. Centr. Am., 459, 1869.

1925. HEROS SALVINI, Günther.

Head $2\frac{3}{4}$; depth $2\frac{1}{4}$. D. XVII, 10; A. VIII or IX, 7; scales 5–29–10. Head somewhat longer than high; snout of moderate extent, longer than eye, pointed; cleft of mouth very oblique; lower jaw projecting; maxillary not quite extending to vertical from anterior margin of orbit; eye immediately below upper profile, in middle of length of head; suboperculum of moderate width, with 1 series of scales; preorbital a little narrower than orbit, with the antero-inferior margin concave. Length of twelfth dorsal spine $\frac{2}{5}$ that of head in specimens from Lake Peten, and $\frac{1}{3}$ in those from Santa Isabel. Fold of lower lip continuous in middle; scales of cheek in 5 series. Base of soft dorsal scaly. Distance between dorsal and caudal considerably less than depth of free portion of tail; distance between vent and root of ventrals $\frac{2}{5}$ length of head. Dark greenish olive, with a black band, edged with yellow, running from snout, through eye, to root of caudal, most distinct on head, but interrupted on tail by lighter interspaces; it passes a black lateral spot, and, in young individuals, terminates in another black spot; an irregular black band along back, below base of dorsal fin; sometimes 3 bands across upper surface of head; a blue horizontal line below orbit; a more or less distinct black ocellus on suboperculum sometimes entirely absent; fins blackish, immaculate, or with faint dots only in small number; sides below black band sanguineous in mature examples. Length 4½ inches. Guatemala. (Günther.) (Named for Osbert Salvin, its discoverer.)

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* These bands not evident in specimens from Nicaragua examined by us (U. S. Nat. Mus., No. 39918).

Heros salvini, GÜNTHER, Cat. Fishes, IV, 294, 1862, Rio de Santa Isabel, Guatemala (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 460, pl. 73, fig. 3, 1869.
Heros triagramma, STEINDACHNER, Denkschr. Akad. Wiss. Wien, XXIII, 1864, 70, taf. 3, fig. 2, Central America. (Coll. Friedrichstal.)

1926. HEROS AFFINIS, Günther.

Head 2¾; depth 2⅖. D. XVI, 8 or 9; A. VIII or IX, 8 or 7; scales 5–29–12. Head as high as long; snout compressed, elevated, with cleft of mouth oblique and with lower jaw prominent; preorbital wider than orbit (in the larger individuals); eye considerably nearer extremity of operculum than to that of snout. Dorsal and anal fins entirely scaleless; dorsal spines rather strong and long, length of twelfth ⅖ that of head; anal spines very strong; free portion of tail a little higher than long. Caudal slightly emarginate, $\frac{2}{9}$ total length; distance between vent and root of ventral ⅓ length of head. Fold of lower lip continuous in middle. Scales on cheek in 4 series. Olive, with 5 or 6 dark cross bands, the middle one of which has a deep-black spot where it passes lateral line; a more or less distinct black spot on suboperculum; sides of head and vertical fins with bluish dark-edged ocelli. Length 5½ inches. Lake Peten. (Günther.) (*affinis*, related—to *Heros aureus*.)

Heros affinis, GÜNTHER, Cat. Fish., IV, 292, 1862, Lake Peten (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 455, pl. 79, fig. 1, 1869.

1927. HEROS MACULIPINNIS, Steindachner.

Head 3; depth 2. D. XVI, 11 or 12; A. VIII, 8; scales 4–30–14. Body short and deep, back considerably arched, the ventral outline also arched; profile depressed before eye; mouth low and rather small, the maxillary scarcely longer than eye; teeth somewhat close-set; eye 3½ in head, as broad as the preorbital; 4 or 5 rows of scales on cheek. Pectoral about as long as head, reaching third anal spine; ventrals slightly longer, reaching fifth spine; soft dorsal, anal and caudal rounded, not scaly at base. Color brownish, with 5 brownish vertical bands not sharply defined, the third band with a large black spot at the point where it crosses a vague dusky stripe from upper edge of gill opening to base of caudal; sides of head usually with blue spots; soft dorsal and anal blue, with many spots of bright yellow; caudal mottled. Length 4½ inches. Rio Zanapa, near Vera Cruz, Mexico. (Steindachner.) (*macula*, spot; *pinna*, fin.)

Heros maculipinnis, STEINDACHNER, Chromiden Mejicos, 15, 1864, Rio Zanapa, Mexico.

1928. HEROS TRIMACULATUS, Günther.

Head 2⅔; depth 2. D. XVII, 11; A. VI to VIII, 9; scales 5–31–14. Head nearly as high as long; snout rather pointed, much longer than eye; cleft of mouth very oblique; lower jaw prominent; maxillary extending nearly to vertical from front margin of orbit; preorbital as wide as orbit, with antero-inferior margin concave; width of orbit ⅕ length of head, but only ⅔ that of interorbital space; eye immediately below concavity of upper profile of head, and very slightly nearer to tip of snout than to opercular margin; opercles scaly; suboperculum with 2 series of scales; vertical fins scaly at base; fold of lower lip continuous in middle; scales of cheek in 5 series; dorsal spines of moderate strength and length, the twelfth rather less than ⅓ length of head; points of soft dorsal and anal extending beyond middle of caudal; caudal much rounded; distance between caudal and dorsal considerably less than depth of free portion of tail; pectoral much shorter than head, extending only to second anal spine; ventrals with outer ray produced; distance between vent and root of ventrals nearly ½ length of head. Dark greenish olive, with 3 black spots, the first above origin of lateral line, the second in middle of side, and the third above end of lateral line; fins black. Length 11 inches. Chiapas and Huamuchal. (Günther.) (*tres*, three; *maculatus*, spotted.)

Heros trimaculatus, GÜNTHER, Fish. Centr. Am., 461, pl. 76, 1869, Chiapas and Huamuchal. (Coll. Salvin.)

1929. HEROS LABIATUS, Günther.

Depth 2½. D. XVII, 11; A. VII or VIII, 8; scales 6–32–13. Head rather longer than high; snout somewhat elevated; cleft of mouth slightly oblique, with lower jaw a little prominent; teeth in narrow bands, those of outer series enlarged, with brown tips; maxillary not nearly attaining vertical from front of eye; preorbital as wide as orbit, the diameter of which is less than extent of snout, and ¼ length of head; interorbital space somewhat convex, wider than orbit; eye situated not quite immediately beneath upper profile of head, and midway between end of snout and that of operculum; opercles scaly, the scales larger than those on cheek; suboperculum with 2 series of scales; soft portions of dorsal and anal fins with minute scales between rays at their base; dorsal spines of moderate length and strength, length of eighth dorsal spine less than ⅓ length of head; points of produced middle rays of soft dorsal and anal reaching to middle of caudal fin; caudal rounded, its length rather more than 5 times in total; anal spines of nearly same length and strength as those of dorsal fin; pectoral rounded, reaching to fourth or fifth spine of anal; ventral filament produced; distance between vent and root of ventral less than ½ length of head; scales on cheek in 4 series; anterior portions of upper and lower lips much enlarged, each forming a moveable subtriangular flap (probably in old males only); depth of free portion of tail scarcely more than its length. Uniform red, or red irregularly marbled with black, or nearly entirely black. Length 7 inches. Lakes Managua and Nicaragua. (Günther). (*labiatus*, thick-lipped.)

Heros labiatus, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 27, pl. 4, fig. 1, Lake Managua, Nicaragua (Coll. Capt. Dow); GÜNTHER, Fish. Centr. Am., 456, 1869.

1930. HEROS LOBOCHILUS, Günther.

Head 2¾; depth 2⅓. D. XVII, 11 or 12; A. VII, 8 or 9; scales 6–32–14. Head as high as long; snout rather elevated, with cleft of mouth oblique, and lower jaw rather prominent; upper profile very concave; teeth in narrow bands, those of outer series enlarged, with brown tips; maxillary not reaching to vertical from front of orbit; preorbital as wide as orbit, very slightly more than 4 times in length of head; interorbital space flat, much wider than orbit; eye immediately below upper profile, slightly nearer to extremity of snout than to that of operculum; opercles scaly, the scales larger than those on cheeks; suboperculum with 1 series of scales; soft portions of anal and dorsal fins with a series of small scales between rays at their base; dorsal spines of moderate strength, length of eighth to twelfth more than ⅓ that of head; points of soft anal and dorsal reaching to middle of caudal; free portion of tail scarcely higher than long; caudal rounded, its length ⅕ of total; anal spines strong and long; pectoral rounded, reaching to fourth anal spine; outer ventral ray produced; distance between vent and root of ventral 3/7 length of head; old males with anterior portions of lips much enlarged, each forming a moveable subtriangular flap; in young males lips simple, fold of lower continuous. Greenish or yellowish, with about 6 indistinct dark cross bands; that below fourteenth dorsal spine with a large black blotch below lateral line; sometimes a black spot on upper half of base of caudal. Length 8 inches. Lake Managua, Nicaragua. (Günther). (*λοβός*, lobe; *χεῖλος*, lip.)

Heros lobochilus, GÜNTHER, Fish. Centr. Am., 457, pl. 75, fig. 1, 1869, Lake Managua, Nicaragua. (Coll. Capt. Dow.)

1931. HEROS ERYTHRÆUS, Günther.

Head 2⅔; depth 2⅓. D. XVII, 12; A. VII, 8; scales 6½–31–14. Head as high as long; snout rather elevated, with cleft of mouth slightly oblique, and lower jaw scarcely prominent; teeth in narrow bands, those of outer series enlarged, with brown tips; maxillary not reaching vertical from front margin of eye; preorbital wider than orbit; diameter of eye nearly 5 times in length of head; interorbital space slightly convex, much wider than orbit; eye near upper profile of head, and equidistant between end of snout and that of operculum; opercles scaly, the scales larger than those on cheek; suboperculum with 2 series of scales; soft dorsal and anal fins with a few minute scales running up between bases of rays; dorsal spines of moderate strength; soft dorsal and anal slightly produced, not reaching to middle of caudal; length of eighth dorsal spine less than ⅓ that of head; caudal rounded, ⅕ total length; anal spines stronger but not longer than those of dorsal fin; pectoral rounded, extending to fourth anal spine, somewhat shorter than head; outer ventral ray produced; distance between ventral and vent ½ length of head; lips thick, with broad free margin in their entire circumference; scales on cheek in 4 or 5 series; depth of free portion of tail conspicuously more than its length. Deep orange color; many of the scales of tail with a blackish spot on base. Length 7 inches. Lake Managua, Nicaragua. (Günther.) (*ἐρυθραῖος*, reddish.)

Heros erythræus, GÜNTHER, Fish. Centr. Am., 457, pl. 75, fig. 2, 1869, Lake Managua, Nicaragua. (Coll. Capt. Dow.)

1932. HEROS BASILARIS, Gill & Bransford.

Depth 2⅓. D. XVI, 12; A. VII, 8. Head normal, snout above convex and blunt in front, length of snout little more than ⅓ length of head; interorbital area slightly raised; preoperculum nearly vertical; buccal scales in 4 rows; jaws normally developed; supramaxillary terminating at a vertical very little in advance of orbit; lips moderately developed and free all around; teeth of outer row of rather large size; dorsal fin moderately developed; anterior spines normally graduated, the rest subequal; soft rays when bent back extending nearly to terminal third of caudal; anal fin commences under thirteenth dorsal spine, its first 3 spines rapidly and the succeeding moderately graduated; longest soft rays when bent back reaching second third of caudal; caudal 4⅓ or 4½ times in extreme length, and its margin is convex-truncate; pectoral fin extending to vertical of third and ventral fin to that of fourth or fifth anal spine; caudal peduncle not much higher at base than long, and decreases very gradually to fin; back declines moderately to tail, and regularly decurved in front of dorsal fin. Color bronzed olive, with (in young, at least) 7 bands; in fourth band is developed a distinct blackish spot just under lateral line, and on base of caudal fin, above lateral line, is another, but smaller, blackish spot; dorsal and anal fins dusky, but soft parts much darker at base than on rest of their fins and surface; caudal fin also much darker at its basal third than behind; pectoral and ventral fins dusky and uniform, save that the filamentary rays of ventrals are darker. Lake Nicaragua. (Gill & Bransford.) (*basilaris*, basal.)

Heros basilaris, GILL & BRANSFORD, Proc. Ac. Nat. Sci. Phila. 1877, 182, Lake Nicaragua.

1933. HEROS NICARAGUENSIS, Günther.

Head 3⅘; depth 2⅖. D. XVIII or XIX, 11; A. VII, 8 or 9; scales 5–35–13. Head much higher than long, in consequence of an adipose swelling above eye (in adult), which renders shape of head *Coryphæna*-like; snout elevated; preorbital wider than orbit, the diameter of which is more than ¼ of length of head; cleft of mouth rather narrow, horizontal, the jaws equal in front; maxillary not extending back to vertical from front of orbit; teeth in a band, those of outer series somewhat enlarged, and with brown tips; interorbital space very convex, not quite twice as broad as orbit; eye about equally distant from end of snout and that of opercle and far below upper profile of head; vertical fins scaly at base; spinous dorsal not very low, the sixteenth spine ½ as long as head; first dorsal spine inserted above upper end of gill opening; dorsal and anal spines long; pectoral not quite as long as head; soft portions of dorsal and anal slightly produced, the former extending nearly to middle of caudal; free portion of tail as high as long; caudal slightly emarginate, its length considerably more than ⅕ total; ventral having outer ray much produced and reaching to sixth anal spine; fold of lower lip interrupted in middle; scales on cheek in 6 series, rather irregularly arranged. Brownish olive above, yellowish below; back with 5 or 6 obscure blackish cross bands, not extending downward to beyond middle of side; many scales with a brown, vertical marginal streak; a lateral spot usually distinct; soft vertical fins with brown spots, each ½ as large as a scale. Length 7 inches. Lake Nicaragua. (Günther.)

Heros nicaraguensis, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 153. Lake Nicaragua (Coll. Capt. Dow); GÜNTHER, Fish. Centr. Am., 465, 1869.

1934. HEROS MANAGUENSIS, Günther.

Head 2½; depth 2½. D. XVIII, 10; A. VII, 8; scales 4½–32–13. Head longer than high; snout of moderate length, somewhat pointed; lower jaw prominent; cleft of mouth oblique; maxillary reaching beyond anterior margin of eye. Width of orbit ⅕ length of head, and ¾ width of interorbital space; eye immediately below upper profile, its distance from end of snout a little more than ½ that from hinder margin of operculum; opercles scaly, the scales on operculum larger than those on cheek; suboperculum with 2 series of scales; preorbital with antero-inferior margin concave, narrow, its greatest width scarcely more than ½ that of orbit; dentition as in *H. dovii;* first dorsal spine inserted behind vertical from upper end of gill opening; dorsal and anal spines of moderate length and strength, length of twelfth dorsal fin 3⅔ times in that of head; vertical fins slightly scaly at base; soft dorsal and anal not reaching to middle of caudal; caudal rounded; distance between dorsal and caudal much less than depth of free portion of tail; pectoral short, more than ½ length of head, and extending only to origin of anal; ventral with outer rays slightly produced, reaching beyond vent; distance between vent and root of ventral not quite ½ length of head. Fold of lower lip continuous in middle; scales on cheek small, rather irregularly arranged, in 8 or 9 series. Greenish brown, shining golden, and irregularly marbled with dark brown; a series of quadrangular black spots (probably a band in young examples) running from eye to a black spot on root of caudal, this spot above lateral line; a brown band descending obliquely from lower posterior angle of orbit to lower posterior angle of operculum; vertical fins with black spots, each spot ½ as large as a scale. Length 7½ inches. Lake Managua, Nicaragua. (Günther.)

Heros managuensis, GÜNTHER, Fish. Centr. Am., 463, pl. 77, fig. 3, 1869, Lake Managua, Nicaragua. (Coll. Capt. Dow.)

1935. HEROS AUREUS, Günther.

Head 3; depth 2⅓. D. XVI, 9 or 10; A. VII, 8; scales 6–33–13. Head as high as long; snout somewhat elevated, with cleft of mouth oblique and with jaws equal anteriorly; preorbital as wide as orbit; eye a little nearer to extremity of operculum than to that of snout; dorsal spines rather slender, length of twelfth a little less than ½ that of head; distance between dorsal and caudal somewhat less than ½ that of head and somewhat less than greatest depth of free portion of tail; caudal slightly emarginate; distance between vent and root of ventral ⅓ length of head; fold of lower lip continuous in middle; scales on cheek in 5 series. Yellowish olive, with 6 dark crossbands extending downward to a yellow longitudinal band running from above pectoral to lower half of base of caudal; the third crossband terminating in a large black lateral spot; sides of head with several bluish dots, and with a blackish spot on operculum and suboperculum, darkest on latter bone; fins light colored, immaculate. Length 5 inches. Guatemala. (Günther.) (*aureus*, golden.)

Heros aureus, GÜNTHER, Cat. Fishes. IV, 292, 1862, Rio Motagua and at Yzabal, Guatemala (Coll. Salvin & Godman); GÜNTHER, Fish. Centr. Am., 455, pl. 73, fig. 2. 1869.

1936. HEROS CITRINELLUS, Günther.

Head $2\frac{4}{5}$; depth $2\frac{1}{5}$. D. XVI or XVII, 12; A. VII, 8 or 9; scales 6–30–13. Head as high as long; snout rather elevated, not obtuse; cleft of mouth almost horizontal; lower jaw scarcely prominent; teeth in narrow bands, those of outer series enlarged, with brown tips; maxillary not reaching vertical from front margin of eye; preorbital wider than orbit; eye close to upper profile, and a little nearer to end of snout than to opercular margin, its diameter $\frac{1}{4}$ length of head; interobital space flattish, twice width of orbit; opercles scaly, the scales larger than those on cheeks; suboperculum with 2 series of scales. Soft anal and dorsal fins slightly scaly at base; points of soft dorsal and anal considerably produced, and extending beyond middle of caudal fin, sometimes to its extremity; first dorsal spine inserted above upper end of gill opening; dorsal and anal spines slender, the eighth or tenth of dorsal fin $\frac{2}{5}$ length of head; pectoral nearly as long as head, long and rounded, and extending to fifth anal spine; outer ventral ray produced; caudal rounded, its length $4\frac{1}{2}$ times in total; distance between vent and root of ventral nearly $\frac{1}{3}$ length of head. Scales on cheek in 4 series; fold of lower lip continuous in middle; free portion of tail conspicuously deeper than long; nape very convex; interorbital space broad, its width $\frac{2}{5}$ length of head. Lemon colored, either nearly uniform or with the back black, which color sometimes forms irregular blotches on vertical fins. Length 8 inches. Lake Nicaragua. (Günther.) (*citrinellus*, lemon colored.)

Heros citrinellus, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 153, Lake Nicaragua (Coll. Capt. Dow); GÜNTHER, Fish. Centr. Am.. 458, pl. 71. fig. 1. 1869.

1937. HEROS MOTAGUENSIS, Günther.

Head $2\frac{5}{6}$; depth 3. D. XVIII, 10; A. VII, 8 or 9; scales 5–32–13. Head longer than high; snout of moderate extent, much longer than eye, pointed; cleft of mouth very oblique, lower jaw very prominent; maxillary reaching nearly to vertical from anterior margin of orbit; width of orbit not quite $\frac{1}{5}$ length of head, and less than width of interorbital space; preorbital with antero-inferior margin but slightly concave, its greatest width equal to that of orbit; dentition as in *H. dovii:* eye near upper profile of head, nearer to end of snout than to that of operculum; opercles scaly; suboperculum with 2 series of scales; vertical fins scaly at base, their points not reaching middle of caudal; caudal rounded; distance between dorsal and caudal somewhat less than depth of free portion of tail; first dorsal spine inserted behind vertical from upper end of gill opening; dorsal and anal spines short, length of twelfth dorsal spine $\frac{2}{9}$

that of head; pectoral short, less than ⅔ length of head, and scarcely reaching to vent; ventral short, pointed, the outer ray produced; distance between vent and root of ventral more than ½ length of head; fold of lower lip continuous in middle; scales on cheek small, in 8 series. Brownish, a black interrupted band running from eye to a spot on root of caudal, this spot above lateral line; an oblique short black streak running from lower posterior angle of orbit toward a spot on suture between operculum and suboperculum, close to interoperculum, the band not continuous with the spot; back with traces of irregular cross bands, more distinct in young than in old individuals; vertical fins with numerous brown dots. Length 10 inches. Rio Motagua and Lake Nicaragua. (Günther.)

Heros motaguensis, GÜNTHER, Fish. Centr. Am., 462, pl. 77, fig. 2, 1869, Rio Motagua, Nicaragua. (Coll. Godman.)

1938. HEROS OBLONGUS, Günther.

Head 3½; depth 3. D. XVIII, 12 or 13; A. VI, 8 or 9; scales 5½–33–15. Head a little longer than high; snout of moderate extent; preorbital wider than eye, the diameter of which is ⅕ length of head; cleft of mouth rather narrow, horizontal, with jaws equal anteriorly; maxillary not extending backward to vertical from front margin of eye; teeth in a band, those of outer series much larger and stronger than others, and with brown tips; interorbital space convex, not quite twice as broad as orbit; eye about equidistant from end of snout and that of opercle; vertical fins scaly at base; spinous dorsal rather low, length of twelfth dorsal spine less than ⅓ that of head; soft dorsal and anal somewhat produced, the former reaching to middle of caudal; free portion of tail rather longer than high; caudal subtruncated, its length a little less than ⅕ total; pectoral shorter than head, about equal in length to ventral, the outer ray of which reaches to vent; fold of lower lip continuous in middle; 5 series of scales on cheek. Brownish, with about 5 very indistinct broad darker cross bands, descending from back to a not less indistinct longitudinal band running from above pectoral to a black spot in middle of root of ventral; vertical fins with transverse series of round whitish spots, separated by a network of dark lines; pectorals yellowish. Length 8 inches. Rio Motagua, Nicaragua. (Günther.) (*oblongus*, oblong.)

Heros oblongus, GÜNTHER, Fish. Centr. Am., 464, 1869. Rio Motagua, Nicaragua. (Coll. Godman.)

1939. HEROS DOVII, Günther.

Head 2⅗; depth 3. D. XVIII, 11 or 12; A. VI, 9 or 10; scales 5½–35–13. Head much longer than high; snout rather elongate, much longer than eye, pointed; cleft of mouth oblique, lower jaw very prominent; maxillary reaching vertical from anterior margin of orbit; width of orbit 4½ times in length of head and equal to that of interorbital space. Eye immediately below upper profile, but considerably nearer to end of snout than to that of operculum; opercles scaly, the scales on operculum larger than those on cheek; suboperculum with 2 series of scales; preorbital with antero-inferior margin but slightly concave, its greatest width ¾ that of orbit; each jaw with a pair of fangs, the lower separate; soft portions of dorsal and anal fins scaly at base and not reaching beyond origin of anal; first dorsal spine inserted behind vertical from upper end of gill opening; dorsal and anal spines slender, length of twelfth dorsal spine ¼ that of head; caudal rounded; pectoral about ⅔ as long as head and scarcely reaching vertical from origin of anal; ventral pointed, slightly produced, reaching only to vent; distance between vent and root of ventral ⅖ length of head; fold of lower lip continuous in middle. Scales on cheek small, rather irregularly arranged, in about 8 series. Brown, irregularly marbled with darker; fins black; an indistinct black band along operculum and side of trunk; an oblique blackish band descending from eye toward root of pectoral; a black spot behind angle of mouth. Length 6 inches. Lake Nicaragua, Nicaragua. (Günther.) (Named for Capt. John M. Dow, the collector of the types.)

Heros dovii, GÜNTHER, Proc. Zool. Soc. Lond. 1864, 154, Lake Nicaragua, Nicaragua; GÜNTHER, Fish. Centr. Am., 461, pl. 73, fig. 4, 1869.

1940. HEROS GIBBICEPS, Steindachner.

Head 2¾; depth 3; eye 5 in head. D. XVII or XVIII, 13 or 14; A. VI, 9 or 10; scales 6–33–12. Body rather elongate, moderately compressed, the back regularly arched. Adult with large fleshy lump above the eye to the nape. Five rows of scales on cheek; preorbital moderate; mouth very small, low; teeth slender; snout projecting beyond the mouth in the adult; cleft of mouth arched, as long as broad, its length equal to that of eye; pectoral short, 1¼ in head, as long as ventrals. Spines moderate; soft dorsal and anal scarcely pointed, scaly at base; caudal rounded. Chocolate brown, yellowish below; a row of dark blotches, 6 or 7 in number, along middle line of body from upper part of gill opening to base of caudal; a dark streak on each scale parallel with the edge; vertical fins vaguely mottled. Length 11 inches. Rio Teapa, Tabasco, Mexico. (Steindachner.) (*gibbus*, gibbous; -*ceps*, head.)

Heros gibbiceps, STEINDACHNER, Chromiden Mejicos, 12, 1864, Rio Teapa, Tabasco, Mexico.

1941. HEROS MICROPHTHALMUS, Günther.

Head 3⅓; depth 2⅓. D. XVIII, 13; A. V or VI, 10 or 9; scales 5–34–14. Head as high as long; snout of moderate extent; preorbital wider than eye; cleft of mouth rather narrow, horizontal, with jaws equal anteriorly; interorbital space very convex, twice as broad as orbit; eye a little nearer to extremity of snout than to that of opercle; vertical fins scaly at base; spinous dorsal low, length of twelfth spine ⅓ or rather less than ⅓ that of head; free portion of tail rather higher than long; pectoral much shorter than head, equal in length to ventral, which does not extend on to vent; fold of lower lip continuous in middle; 6 series of scales on cheek. Brownish, with indistinct dark cross bands, and with a dark band along sides and tail, terminating at a black spot in middle of root of caudal; each scale on lateral and lower parts with a purple spot at base; soft portions of vetical fins with series of blackish dots; axil of pectoral orange-colored. Length 8 inches. Rio Motagua, Nicaragua. (Günther.) (*μικρός*, small; *ὀφθαλμός*, eye.)

Heros microphthalmus, GÜNTHER, Cat. Fishes, IV, 295, 1862, Rio Motagua, Nicaragua. (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 464, 1869.

1942. HEROS UROPHTHALMUS, Günther.

Head nearly 3; depth 2¼ to 2½. D. XVII, 11; A. VI, 9; scales 5–28–12. Head as high as long; snout rather elevated, with cleft of mouth oblique and with lower jaw prominent; preorbital as wide as orbit; interorbital space flat, wider than orbit; eye nearer to extremity of snout than to that of operculum; dorsal spines of moderate length and strength, length of twelfth ⅖ that of head; free portion of tail higher than long; anal spines strong and long; distance between vent and root of ventral ⅗ length of head. Fold of lower lip continuous in middle. Scales on cheek in 6 series. Brownish or greenish olive, with 7 blackish cross bands as broad as interspaces between, the first descending obliquely backward across nape; the second, third, and fourth below the dorsal spines; the seventh across free portion of tail; a large, black, white-edged ocellus on root of caudal; fins blackish; pectoral yellowish toward base. Length 7 inches. Lake Peten, Guatemala. (Günther.) (*οὐρά*, tail; *ὀφθαλμός*, eye.)

Heros urophthalmus, GÜNTHER, Cat. Fishes, IV, 291, 1862, Lake Peten (Coll. Godman & Salvin); GÜNTHER, Fish. Centr. Am., 454, pl. 72, fig. 1, 1869.

1943. HEROS TROSCHELI, Steindachner.

Head 2⅔; depth 2⅕. D. XVI, 10 or 11; A. VI, 8; scales 5–32 to 34–13; eye 4⅓ in head, 1⅔ in snout; cheeks with 5 or 6 rows of scales. Body short and deep, the back elevated but not much arched; mouth small, not longer than eye, little curved; the outer teeth strong; pectoral rounded, shorter than head, not reaching first anal spine; caudal rounded; ventrals short, spines moderate; soft dorsal and anal scaly at base, pointed at tip. Brownish, with 7 dusky cross bands curved forward; a large round diffuse blackish blotch at base of caudal, mostly above end of lateral line; a deep black longitudinal spot, part of the first dark cross band, behind base of pectoral; fins dusky bluish, unspotted. Length 7 inches. Mexico. (Steindachner). (Named for Professor Troschel.)

Heros troscheli, STEINDACHNER, Ichthyologische Notizen, IV, 12, 1867, Mexico.

1944. HEROS CYANOGUTTATUS (Baird & Girard).

Head 3¼; depth 2⅙; eye 4; snout 3. D. XVII, 10; A. VI, 8; lateral line 25. Body oval, moderately compressed; profile gently curved; interorbital region slightly depressed; eyes small, situated rather backward and high up; mouth small, maxillary not reaching orbit; 6 rows of scales on cheek; fins high; longest dorsal spine equal to distance from snout to pupil; soft rays longer, 1¾ in head; longest anal rays 1¼ in head, equal to length of pectoral. Brownish, body and soft parts of vertical fins everywhere with small blue spots; sometimes a black spot on middle of spinous dorsal, with another one below it on back; a black blotch at base of caudal. Rivers of southwestern Texas and northeastern Mexico; chiefly confined to the basin of the Rio Grande; the only species of *Cichlidæ* entering the United States. (*κυάνεος, cyaneus,* blue; *guttatus,* spotted.)

Herichthys cyanoguttatus, BAIRD & GIRARD, Proc. Ac. Nat. Sci. Phila., VII, 1854, 25, Rio Grande, Brownsville, Texas (Type, No. 851. Coll. John H. Clark); BAIRD & GIRARD, U. S. and Mex. Bound. Surv., Zool., 30, pl. 4, figs. 9-12, 1859.

Heros cyanoguttatus, GÜNTHER, Cat. Fishes, IV, 290, 1862; JORDAN & GILBERT, Synopsis, 608, 1883.

1945. HEROS PAVONACEUS, Garman.

Head 2⅔; depth 2⅔. D. XVI, 12; A. V, 8; scales 4–32–12. Head as deep as long; eye large, wider than preorbital, its front behind tip of maxillary; 5 rows of scales on cheek; lower lip not described; fifth dorsal spine highest; soft dorsal and anal reaching caudal; pectorals to vent. Dark brown, flecked with pale; 4 to 7 ocellated, vertically expanded black spots on side below dorsal fin; an ocellated black spot on base of tail above lateral line; side with 10 or 12 faint dark cross bands. Monclova, Coahuila, Mexico. (Garman). (*paronaceus*, like a peacock.)

Heros pavonaceus, GARMAN, Bull. Mus. Comp. Zool., VIII, 93, 1881, Spring near Monclova in Coahuila, Mexico; JORDAN & GILBERT, Synopsis, 939, 1883.

1946. HEROS ALTIFRONS, Kner & Steindachner.

Head 2⅘; depth 2⅖. D. XVI, 11; A. V, 8 or 9. Snout rather high, width of preorbital more than that of orbit. Jaws equal in length. Eye considerably nearer to end of operculum than to that of snout. Dorsal spines of moderate length and strength. Lower lip dilated into a lobe on each side, which is broadest behind. Scales on cheek in 4 or 5 series. Body with 4 or 5 dark vertical bands,* each band with a darker blotch; scattered pearl-colored dots all over body; a dark spot on middle of root of caudal fin. Isthmus of Panama and southward. (Kner & Steindachner.) (*altus,* high; *frons,* forehead.)

Heros altifrons, KNER & STEINDACHNER, Sitzgeber. bayer. Akad., 223, 1863, New Granada; Abhandl. bayer. Akad., X, 11, taf. 2, fig. 1; GÜNTHER, Fish. Centr. Am., 459, 1869.

1947. HEROS BEANI, Jordan.

(MOJARRA VERDE.)

Head 3; depth 2⅐. D. XVI, 11; A. V, 8; scales 4½–30–12. Body oblong, compressed, the back moderately elevated; profile gibbous at nape, depressed and concave above eyes, thence straight to tip of snout, which is short and rather sharp; snout 3 in head; eye small, 4½ in head, 1⅓ in the slightly concave interorbital space; lower lip moderate, its fold continuous, without frenum; teeth moderate, maxillary short, 3⅓ in head; lower jaw slightly projecting; preorbital, 4½ in head; 6 rows of scales on cheek; edge of preopercle oblique, straight, entire; gill rakers very short, thickish; dorsal spines low, the longest a little shorter than snout; soft dorsal and anal elevated, pointed, their tips reaching a little past base of caudal, the longest ray about 1⅓ in head; bases of soft dorsal and anal somewhat scaly; caudal subtruncate; ventrals reaching beyond pectorals, nearly to front of anal, 1⅓ in head; pectorals 1⅓; origin of ventral spine under pectoral base. Color olive, the centers of many scales on sides of body and head paler in some specimens (♀ ?) and darker in others (♂ ?); sides with traces of about 8 obscure dark cross bars, which are about as wide as the interspaces; a faint pale streak from below eye to maxillary; an obscure black spot, most distinct in young and rather larger than eye, on lateral line and below eleventh and twelfth dorsal spines; a similar spot at base of caudal, just above lateral line; fins olivaceous, the dorsals, caudal, and anal with roundish spots of dark olive; lower fins dusky. Adult in life with a black spot on each scale, these forming series; first dorsal edged with dark red, the 2 black blotches and black bars obsolete. Young, light olive, banded with darker, with the bars and blotches distinct; no blue, yellow, or red. Length 4 to 8 inches. Rio Presidio, Mazatlan; a very abundant species, the northernmost of the family on the Pacific coast; used as food. (Named for Dr. Tarleton Hoffman Bean, now director of the New York Aquarium, "in recognition of his researches in American ichthyology.")

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* Kner & Steindachner describe them as "*tæniæ*," instead of "*fasciæ*." (Günther.)

Heros beani, JORDAN, Proc. U. S. Nat. Mus. 1888, 332, Rio Presidio, near Mazatlan. (Types Nos. 37145, and 37165. Coll. Alphonse Forrer); JORDAN, Proc. Cal. Ac. Sci. 1895, 473.

1948. HEROS TETRACANTHUS (Cuvier & Valenciennes).

(VIAJACA.)

Head 2¾ to 3; depth 2½. D. XV or XVI, 10 to 12; A. IV or V, 7 to 9; scales 5–30 or 31–10; pores of lateral line 18+12. Head as long as high, with the upper profile concave above eyes; snout of moderate extent, its length ⅓ that of head; cleft of mouth very oblique, not extending to below anterior margin of eye; lower jaw prominent; preorbital rather narrower than orbit, diameter of which is $\frac{2}{9}$ length of head; interorbital space wider than orbit, its naked portion flat; eye immediately below upper profile, nearer to extremity of snout than to that of operculum. Scales ctenoid, those on cheek small, in 7 horizontal and 10 vertical series; basal portion of vertical fins scaly; snout, preorbital, and lower jaw naked; scales before dorsal varying much in size; dorsal spines rather feeble, nearly ⅓ that of head; soft dorsal and anal somewhat elevated in middle, extending slightly beyond base of caudal; anal spines of moderate length and strength; caudal rounded; pectoral rounded, equal in length to distance of snout from posterior margin of preoperculum, about reaching to tips of ventrals; ventral pointed, origin of ventral spine under pectoral base, a little more than ½ length of head, not extending to vent; 2 pores near angle of opercle; teeth in jaws forming a band, those in outer series enlarged; lower pharyngeal somewhat longer than broad, with short cardiform teeth, those in middle of its posterior ½ obtusely conical or molar-like. Fold of lower lip continuous in middle; 7 series of scales on cheek. Brownish; each scale with a dark-brown spot at base, the spots forming longitudinal series; margins of preoperculum with several similar spots; a pair of dark-brown spots in axil of pectoral, one superiorly, the other inferiorly; dorsal fin with obsolete brown spots, the other fins immaculate; 4 well-marked dark-brown lengthwise streaks on head, the first from posterior margin of eye to angle of opercle, the second on lower edge of eye, the third above angle of mouth, the fourth a little below it; the last 3 extending over the opercles; dorsal, anal, and caudal with large dark spots. Length 6 inches. Rivers of Cuba; locally common; a food fish of some importance. Here described from a specimen from Rio Almendares, Cuba, 4½ inches in length. (*τέτρα*, four; *ἄκανθα*, spine.)

Centrarchus tetracanthus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 460, 1831, Cuba.

Chromis fusco-maculatus, GUICHENOT, Ramon de la Sagra, Hist. Ile Cuba, Poiss., 78, pl. 2, fig. 3, 1850, Havana.

Acara fusco-maculata, GÜNTHER, Cat. Fishes, IV, 282, 1862.

Acara tetracanthus, STEINDACHNER, Chromiden Mejicos, 4, 1864.

617. THERAPS, Günther.

Theraps, GÜNTHER, Cat. Fishes Brit. Mus., IV, 284, 1862 (*irregularis*).

Body compressed, oblong, covered with moderate ctenoid scales, those of the lateral line not enlarged; teeth conical, in a band; mouth small, the lower jaw included; scales on cheeks small; gill rakers short, horny; dorsal and anal not scaly; anal spines normally 5, sometimes 4. Central America.

(*θέραφ*, slave, probably from some resemblance to *Therapon theraps*, an East Indian fish allied to *Pomadasis*.)

1949. THERAPS IRREGULARIS, Günther.

Head 3½; depth 3½. D. XVI, 13; A. V, 9; scales 4–35–14. Head longer than high; snout compressed and prominent, its length ⅖ that of head, and nearly twice width of orbit; cleft of mouth rather small, extending backward somewhat behind the vertical from nostril; upper jaw slightly overlapping lower; teeth in a narrow band, those of the outer series largest; preorbital somewhat wider than orbit, its width being equal to that of interorbital space, which is rather convex; eye immediately below upper profile, its center being a little behind middle of length of head. Scales on cheek small, in 6 oblique series. Posterior limb of preoperculum longer than the inferior and descending obliquely forward; scales on opercles as large as those on neck; those near base of dorsal and on abdomen very small. Scales ctenoid; dorsal fin commencing above root of ventral, and not scaly; spines of moderate length and strength, length of the fifteenth $\frac{2}{7}$ that of head, soft portion not extending to caudal, if laid backward; the distance between dorsal and caudal equals that of the extremity of snout from posterior margin of orbit; caudal rounded; pectoral shorter than head; ventral spine only ½ as long as fin, and enveloped in skin together with the first soft ray; fin not extending to vent; outer branchial arch provided with short horny processes; lower pharyngeal broader than long, the lateral halves not firmly united, armed with villiform teeth, and with 2 rows of stronger conical teeth along the middle. Reddish-olive, marbled with blackish, the latter color forming 7 rather irregular transverse bands, some of which extend on dorsal fin; belly silvery, marbled with blackish; opercles and some scales on body with blue dots. Length 6 inches. Guatemala. (Günther.) (*irregularis*, irregular.)

Theraps irregularis, GÜNTHER, Cat. Fishes, IV, 284, 1862, Guatemala. (Coll. Salvin.)
Heros irregularis, GÜNTHER, Fishes Centr. Am., 467, pl. 78, fig. 2, 1869.

618. NEETROPLUS, Günther.

Neetroplus, GÜNTHER, Fish. Cent. Am., 469, 1869 (*nematopus*).

This genus differs from *Heros* and *Cichlasoma* chiefly in having anteriorly a row of flat incisor-like teeth, behind which is a band of villiform teeth. Central America. (*νεός*, new; *Etroplus*, a related genus found in India; *ἦτρον*, abdomen; *ὅπλον*, armature).

a. Dorsal rays XIX, 10; anal rays VIII, 7. NEMATOPUS, 1950.
aa. Dorsal rays XVIII, 11; anal rays VII, 7. NICARAGUENSIS, 1951.

1950. NEETROPLUS NEMATOPUS, Günther.

Head $3\frac{2}{5}$; depth $2\frac{3}{5}$. D. XIX, 10; A. VIII, 7; scales $5\frac{1}{2}$–34–12. Head as high as long, with an adipose prominence over eye, which renders profile of forehead somewhat abrupt; snout rather compressed and prominent, length of snout $\frac{2}{5}$ that of head, and more than width of orbit, which is nearly $\frac{1}{3}$ length of head; cleft of mouth small, extending backward somewhat behind vertical from nostril; jaws equal in front; teeth in a band, those of outer series genuine incisors, which appear to be replaced by smaller ones, standing behind in a band; incisors $\frac{10}{8}$; preorbital wider than eye, equal in width to interorbital space, which is convex; eye at some distance from upper profile, nearer to end of opercle than to that of snout; scales on cheek small, in about 5 oblique series; posterior limb of preoperculum about twice as long as the inferior, and descending obliquely forward; scales on opercles as large as those on neck; those near base of dorsal and on abdomen very small; dorsal fin commencing above vertical from hinder margin of operculum; dorsal and anal scaly at base; spines rather strong, the sixteenth dorsal spine nearly $\frac{1}{2}$ length of head; soft portions of both fins produced, reaching beyond middle of caudal; caudal truncated; pectoral shorter than head; outer ray of ventral produced into a filament as long as the fin; fold of lower jaw interrupted in middle; 5 series of scales on cheek. Brownish olive, with irregular darker clouds. Length $4\frac{1}{2}$ inches. Lake Managua, Nicaragua. (Günther.) (*νῆμα*, thread; *πούς*, foot.)

Neetroplus nematopus, GÜNTHER, Fish. Centr. Am., 470, pl. 74, fig. 4, 1869, Lake Managua, Nicaragua. (Coll. Capt. Dow.)

1951. NEETROPLUS NICARAGUENSIS, Gill & Bransford.

Head short; depth 2½. D. XVIII, 11; A. VII, 7. Snout convex forward and subtruncated in front; length (or depth) of snout equaling nearly ½ that of head; interobital area convex; preoperculum moderately oblique; supramaxillaries terminating at a vertical about a pupil's length in advance of orbits; lips moderately developed, the lower interrupted by a broad isthmus in front; caudal peduncle slender, its length equaling its height; dorsal spines increasing in a bold curve from first to fifth, the rest subequal; the soft rays, when bent back, reaching nearly to terminal half of caudal; anal fin commencing about under fourteenth dorsal spine, the first 3 spines rapidly increasing, the succeeding more slowly, the longest rays reaching to second third of caudal fin; caudal fin forming about ¼ of extreme length, its posterior margin truncated; pectoral fin extending to about a vertical with the anus; ventral fin to about the third or fourth anal spine, the filament of the external ray moderately produced. Color olive brown, almost uniform; fins also uniform, save that perhaps the soft portion of dorsal and anal are darker at base. Lake Nicaragua. (Gill & Bransford.)

Neetroplus nicaraguensis, GILL & BRANSFORD, Proc. Ac. Nat. Sci. Phila. 1877, 186, Lake Nicaragua.

619. SATANOPERCA, Günther.

(PAPPATERRAS.)

Geophagus, HECKEL, Brasil. Fluss-Fische. Ann. Wien. Mus. 1840, 383 (*surinamensis*).

Body compressed, oblong, covered with moderate, ctenoid scales; eye behind middle of head; mouth moderate, the teeth very small, conical, in narrow bands; fold of lower lip interrupted mesially; preorbital deep; dorsal spines 13 to 15; anal spines 3; base of soft dorsal naked; cheek with small scales; outer gill arch provided with a compressed lamelliform lobe above, its concave side provided with short horny processes, the edge of the lobe with more or less distinct papillæ. Fresh waters of Brazil and Peru; 1 species entering our limits. This genus is very close to *Geophagus,* with which Steindachner and Eigenmann have reunited it. The soft dorsal is scaly at base in *Geophagus.* (*σατανᾶς*, a demon; *πέρκη*, perch; the type species was called a devil, *Geophagus dæmon,* for no obvious reason.)

1952. SATANOPERCA CRASSILABRIS (Steindachner).

Head 2⅔; depth 2⅗; eye 5 in head; snout 1¾; maxillary 3; mandible 3. D. XVI, 9; A. III, 8; scales 5–35–9. Body short and stout; snout long, the dorsal outline abruptly and strongly arched above the eyes, forming a prominent hump; ventral outline gently curved; caudal peduncle long and slender; mouth moderate, little oblique, maxillary not reaching more than ⅖ distance to vertical of orbit; premaxillaries protractile; upper lip with a broad flap in front, and strongly resembling that of *Heros lobochi-*

lus, but not extended in a long flap; lower lip parted in the middle and depending on each side as a flap; jaws each with a band of small teeth, the band increasing rapidly in width toward the front, the outer teeth somewhat enlarged, their tips golden brown; the small dot-shaped nostril nearer eye than snout; preorbital about twice diameter of eye, twice as long as wide, and without scales; opercle and preopercle entirely scaled, the interopercle scaleless. Dorsal spines moderate, the length of the first about 2 in eye, that of the eighth about ⅔ eye; soft dorsal falcate, the first rays produced, reaching middle of caudal, 1¼ in head; anal rays strong, graduated, the third equal to length of longest dorsal spine; soft portion of anal falcate, resembling the corresponding part of the dorsal, the rays of about the same length; pectoral reaching origin of anal, 1⅓ in head; ventral falcate, the first ray produced and nearly as long as pectoral, the spine equal to third anal spine. Anterior portion of lateral line with 20 pores, the posterior part with about 12, the line broken under the last dorsal rays. Color in alcohol, brownish above, lower parts yellowish, the scales bordered with dark brown; traces of 4 or 5 darker cross bars; cheek blue. Panama (Steindachner); not seen by us. (*crassus*, thick; *labrum*, lip.)

Geophagus (*Satanoperca*) *erassilabris*, STEINDACHNER, Ichth. Beitr., v, 17, pl. 7, 1876, Isthmus of Panama, near Candelaria.

Family CLIX. POMACENTRIDÆ.

(THE DEMOISELLES.)

Body short, deep, compressed, covered with ctenoid scales of varying size; lateral line wanting posteriorly; mouth small, usually with rather strong teeth, either conic or incisor-like; vomer and palatines toothless; nostril single on each side, nearly round; preopercle with its posterior edge largely free, serrate or entire; preorbital sheathing the small maxillary; dorsal fin single, with numerous strong spines, the spinous portion longer than the soft, which is similar to the soft anal, both fins scaly at base; anal spines 2; ventral fins thoracic, I, 5, the anterior rays longest, usually filamentous; a scaly appendage at base of ventral. Lower pharyngeals fully united; branchiostegals 5 to 7; gills 3½, the slit behind the last gill very small or obsolete; gill rakers rather long and slender; no labyrinthiform appendage; air bladder and pseudobranchiæ present; pyloric cæca 2 or 3; gill membranes free from the isthmus. Vertebræ 12+14=26. Fishes of the tropical seas, similar in mode of life to the *Chætodontidæ*, feeding on small marine animals and plants in the coral reefs. Genera 15; species about 180, most of them too small to be used as food. They are very active in life and the coloration is usually brilliant, sometimes changing much with age. The family shows strong affinities with the *Labridæ* in its gill structures and pharyngeals. In other respects it approaches the *Kyphosidæ*, while the unique character of the simple nostril is shared with the *Cichlidæ* only, from ancestors of which group the *Pomacentridæ* are probably descended. (*Pomacentridæ*, Günther, Cat., IV, 2–64.)

I. Scales large, 25 to 40 in lengthwise series.
POMACENTRINÆ:
- *a* Teeth fixed, conical or incisor-like, covering nearly the whole free edge of each jaw; carnivorous species.
  - *b.* Teeth conical, in 2 to 4 series, the outer enlarged and bluntish; preopercle entire; scales large.
    - *c.* Body slender, the depth about $\frac{1}{3}$ length; lateral line subcomplete; tail deeply forked. AZURINA, 620.
    - *cc.* Body oblong, the depth $\frac{2}{5}$ to $\frac{2}{3}$ length; lateral line wanting on tail. CHROMIS, 621.
  - *bb.* Teeth more or less flattened or incisor-like, in 1 or 2 series.
    - *d.* Preopercle, and usually preorbital also, sharply serrate.
      - *e.* Teeth entire, strictly uniserial in each jaw; preorbital not very deep, its edge not notched: snout scaly; lower jaw naked. EUPOMACENTRUS, 622.
    - *dd.* Preopercle and preorbital strictly entire; snout naked.
      - *f.* Suborbitals entirely adnate to the cheeks. NEXILARIUS, 623.
      - *ff.* Suborbitals not adnate to the cheeks.
        - *g.* Teeth emarginate or Y-shaped; preorbital moderate. ABUDEFDUF, 624
        - *gg.* Teeth entire; preorbital very deep. HYPSYPOPS, 625.

MICROSPATHODONTINÆ:
- *aa.* Teeth movable, incisor-like, in 1 row on front of each jaw; the lower jaw weak, with teeth along its front only; preopercle and preorbital entire; snout scaled almost to lips; preorbital notched behind nostril; lower limb of preopercle scaled; soft dorsal and anal elevated; caudal deeply forked; soft anal rather long, of 14 or 15 rays; herbivorous species. MICROSPATHODON, 626.

620. AZURINA, Jordan & McGregor, new genus.

Azurina, JORDAN & MCGREGOR MS., Fishes of the Revillagigedo Islands, 1898 (*hirundo*).

This genus is closely allied to *Chromis*, from which it differs in the long and slender body, the low vertical fins, the very deeply forked tail, the pointed snout, and especially in the continuous lateral line which extends much beyond the dorsal fin and is wanting on but 2 or 3 scales. (*azureus*, blue.)

1953. AZURINA HIRUNDO, Jordan & McGregor, new species.

Head 4 in length; depth $3\frac{1}{3}$. D. XII, 11; A. II, 11; scales 34; maxillary 3 in head; eye $4\frac{1}{4}$; pectoral 1; ventral $1\frac{1}{2}$; longest dorsal spine $3\frac{2}{3}$, longest soft ray 4; second anal spine $3\frac{1}{2}$, longest soft ray 3; caudal lobes $1\frac{1}{3}$; middle caudal rays 4. Body elongate elliptical, slender and symmetrical; moderately compressed; snout acute; profile slightly depressed above. Eye moderate, larger than in related species; maxillary reaching to below front of eye. Teeth conical, rather few and small, in narrow bands or almost a single series Preorbital very narrow, about $\frac{1}{2}$ eye; suborbital hidden by scales. Preopercle narrow, largely free, its edge slightly crenulate; gill rakers 36, long and slender; head covered with small scales except throat and tip of snout; those on body large and ctenoid; lateral line strongly curved, continuous, extending downward along the tail, wanting on 2 of

3 scales only. Caudal deeply forked. Color deep steel blue above, slightly paler below with a tinge of orange at throat. Pectoral light yellow, dusky at base; other fins black, each with a narrow whitish edge. West coast of Mexico. Three specimens from Guadalupe Island, each 6½ inches long. A beautiful fish with a symmetrical outline, unusual in this family. (*hirundo*, a swallow.)

Azurina hirundo, JORDAN & McGREGOR, new species, Guadalupe Island. (Coll. Richard Crittenden McGregor.)

621. CHROMIS,* Cuvier.

(CHAUFFE-SOLEILS.)

Chromis, CUVIER, Memoirs du Mus. d'Hist. Nat. 1815 (*chromis*).
Heliases, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 495, 1830 (*insolatus*).
Furcaria, POEY, Memorias Cuba, II, 194, 1860 (*puncta* = *multilineatus*).
Ayresia, COOPER, Proc. Cal. Ac. Sci. 1863, 73 (*punctipinnis*).
Heliastes, GÜNTHER, corrected spelling.

Body oblong or ovate, the depth $\frac{2}{5}$ to $\frac{2}{3}$ the length of the body without caudal. Preopercle entire, or nearly so; lateral line wanting on tail. Mouth small; teeth small, conical, in 2 or more series, the outer series enlarged and blunt. Scales rather large, 24 to 30 in a longitudinal series; suborbital and lower jaw scaly. Dorsal fin with 12 to 14 spines; caudal more or less forked, the lobes rounded or acute. Branchiostegals normally 5. Pyloric cæca 2. Gill rakers long and slender. Tropical seas; species numerous, varying considerably in form, perhaps divisible into 4 genera: *Chromis*, *Heliases*, *Ayresia*, and *Furcaria*. (*χρομίς*, the ancient name of some fish, probably a Sciænoid, from *χρέμω*, to neigh, from the noise made by the fish; akin to the names Grunter, Croaker, Drum, Hogfish, Burro, Ronco, Roncador.)

I. Body oblong, elliptical, graceful in form, the caudal peduncle long, the low, pointed, soft dorsal and anal not reaching caudal; interorbital space narrow and high; caudal deeply forked, its lobes acute.
  FURCARIA (*furca*, fork):
    a. Dorsal spines 12; snout rather acute.
      b. Caudal fin with a broad black border on each lobe; dorsal blackish, the last rays pale. ATRILOBATUS, 1954.
      bb. Caudal fin without black border, pale or edged with orange.
        c. Color bright blue, with a violet spot on each scale; caudal translucent behind. CYANEUS, 1955.
        cc. Color violet brown; a black spot at base of pectoral; a large orange spot behind last ray of dorsal; dark streaks along the rows of scales; dorsal and caudal edged with orange. MULTILINEATUS, 1956.
  AYRESIA:†
    aa. Dorsal spines 13; snout obtuse.
      d. Color dusky olive, the vertical fins and posterior part of the body covered with round dark spots. PUNCTIPINNIS, 1957.

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* The name *Chromis*, originally used for the European species of this genus, *Chromis chromis* L = *Chromis castaneus* of authors, has been improperly transferred by several writers to an African genus of *Cichlidæ*, for which the proper name is *Tilapia*.

† Named for Dr. William O. Ayres (1817–1891), formerly of Brookhaven, Long Island; for many years the ichthyologist of the California Academy of Sciences; an earnest student of fishes.

II. Body oblong or ovate, rather deep, the caudal peduncle short, the last rays of dorsal and anal reaching past base of caudal; caudal fin moderately forked, its lobes mostly rounded; dorsal spines 13 or 14.

HELIASES (ἡλιάζω, to grow warm in the sun):

- *e.* Dorsal spines 13;[*] interorbital space[†] broad and flattish; eye large; body deep.
  - *f.* Caudal and other fins plain dusky. INSOLATUS, 1958.
  - *ff.* Caudal, posterior half of dorsal and anal, and whole of pectorals, deep yellow; a blue line on each side of head. ENCHRYSURUS 1959.

Subgenus FURCARIA, Poey.

1954. CHROMIS ATRILOBATUS, Gill.

Head about 4½ in total length; depth about 3⅓. D. XII, 12; A. II, 12; scales 4–32 or 33–10, 21 pores. Head longer than high, the forehead and snout above nearly rectilinear; interorbital area transversely arched, its width equaling diameter of eye; preopercle oblique, its lower half scarcely emarginate, its angle rounded; mouth small and very oblique; teeth conic, curved, continuous to the angles of the mouth, larger in front, a transverse row of smaller ones behind. Origin of dorsal fin above base of ventrals, spinous portion rather elevated, its last spines shorter than the preceeding; second anal spine as long as the succeeding rays, which are nearly uniform or even slightly increased toward the last; the caudal fin forms more than a quarter (.27) of the extreme length, its lobes, especially the upper, prolonged and pointed; pectorals long and bluntly angulated; first ventral ray filiform and equal to the pectorals, its base behind that of the pectorals. Color olivaceous (the type deep green from the stain of a copper tank), the dorsal blackish except last 4 or 5 rays, which are colorless; a very distinct spot of sulphur yellow just behind dorsal fin extending obliquely downward and forward; margins of caudal above and below, black. Length about 4 inches. (Gill.) Cape San Lucas and southward; rare; 2 or 3 specimens known. (*ater*, black; *lobatus*, lobed.)

Chromis (*Furcaria*) *atrilobata*,[‡] GILL, Proc. Ac. Nat. Sci. Phila. 1862, 149, Cape St. Lucas. (Coll. Xantus.)

Chromis atrilobata, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 220; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 366.

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[*] In the European subgenus *Chromis* there are 14 dorsal spines; the head is narrow, and the interorbital space high and rounded as in *Furcaria* and *Ayresia*. The caudal peduncle, as in *Heliases*, is shortish, the dorsal and anal reaching past front of caudal.

[†] Although the form of suborbital area in *Heliases* seems to be quite unlike that in *Furcaria* and *Chromis*, the difference is mainly external. The supraoccipital crest is not extended on the frontals in any of them. It is merely a little lower in *Heliases*, with no other peculiarities in form or extension.

[‡] Dr. Günther has wrongly identified this species with the Brazilian species,

CHROMIS MARGINATUS (Castelnau).

The following notes are taken on specimens of *C. marginatus* from Bahia. Dorsal spines 12, rather low; scales 3–30–10. Body oblong-elliptical, with long caudal peduncle; head narrow; interorbital space high, rounded; gill rakers numerous, long and slender; pectoral a little longer than head, not quite reaching anal; soft dorsal and anal low, pointed behind, not reaching base of caudal; upper lobe of caudal longest, the fins deeply forked. Color, bluish olive, a black spot within axil and on base of pectoral; dorsal black, except the last rays; each lobe of the pointed caudal black, the middle of the fin pale; traces of 3 lengthwise stripes of yellow on the body. Close to *Chromis cyaneus*, but without blue spots on the scales.

1955. CHROMIS CYANEUS (Poey).

Depth 3½ in total length with caudal; eye 3 in head. D. XII, 12; A. II, 12. Profile of snout formed by 2 equal curves; upper lobe of the caudal longer than the lower; soft dorsal and anal higher than in *multilineatus;* color bright Prussian blue with a darker violet spot on each scale; back and vertical fins darker, ventral paler; posterior part of the caudal translucent. Length 120 mm. Cuba. (Poey.) (*cyaneus, κυανεός*, blue.)

Furcaria cyanea, POEY, Memorias, II, 196, pl. 14, figs. 5–8, 1860, Havana.
Heliastes cyaneus, GÜNTHER, Cat., IV, 64, 1862.

1956. CHROMIS MULTILINEATUS (Guichenot).

Head 3⅗; depth 2⅔; eye 3¼ in head. D. XII, 11; A. II, 12; scales 4–28–9. Body elongate, both curvatures about equal, head slightly concave in front of eye; eye low, a line from tip of snout to tip of opercle passing through lower edge of pupil; maxillary slipping under preorbital, its tip below anterior margin of orbit; a band of villiform teeth in each jaw, in front of which is a single row of conical-pointed teeth, the most anterior larger, especially in lower jaw; no regular serræ on any of the opercular bones, but the preopercle slightly rough at angle, opercle with a single obtuse point; snout equal to eye; lateral line ceasing on front of end of dorsal, with 19 scales; a series of disconnected pores along side of tail; fourth dorsal spine highest, 2⅕ in head; soft dorsal pointed, the tips reaching base of caudal, longest ray 1⅗ in head; second anal spine 2 in head, equal to soft rays; pectoral equal to head; ventral slightly filamentous, reaching past vent, 1⅓ in head; axillary scale and scale between the fins long, attenuate; caudal deeply forked, the lobes pointed (the upper lobe is broken off, so that we cannot tell whether the lobes are equal). Color in alcohol, back dusky, becoming paler with bluish on the sides, with faint lines along side of belly, with white below; dorsal black, the last 4 or 5 rays white; middle rays of caudal white, outer rays dusky; anal slightly dusky; pectoral colorless, the axil black, the black showing as a small blotch at upper base; ventrals white; a sulphur-yellow blotch across tail behind dorsal. West Indies. Here described from a single specimen 4½ inches long (No. 4963 L. S. Jr. Univ. Mus.) from Jamaica. (*multum*, many; *lineatus*, lined.)

Heliases multilineatus, GUICHENOT, Ramon de la Sagra, Poiss., Cuba, 76, pl. 2, fig. 2, 1855, Havana; in part; confused with *Kyphosus incisor*; GÜNTHER, Cat., IV, 64, 1862.
Furcaria puncta,* POEY, Memorias, II, 195, 1860, Havana.
Chromis multilineatus, JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 117.

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* Poey's description of *Furcaria puncta* is in substance as follows:

Head 4⅓ in total length with caudal: depth more than 3; eye 3½ in head. B. 7; D. XII, 11; A. II, 11 or 12; scales 30–12; soft dorsal high; second anal spine as long as the soft rays; tip of the ventral filamentous. Color violet brown; base of the pectoral with a large black spot; a large orange spot close behind the last ray of the dorsal; each scale with a brown base forming even longitudinal streaks; a whitish streak along the lateral line; dorsal fin bordered with bright orange; an orange border to the caudal, rather faint; other fins growing yellowish at the tip. Gill rakers very long; vertebræ 11 + 15 = 26. Length 5½ inches.

Subgenus AYRESIA, Cooper.

1957. CHROMIS PUNCTIPINNIS (Cooper).

(BLACKSMITH.)

Head 4; depth 4⅔. D. XIII, 11; A. II, 10; scales 4–29–10, 18 pores. Body oblong, somewhat regularly elliptical, the caudal peduncle long. Head blunt, short, and deep, the profile abruptly descending to the snout. Interorbital space high and rounded. Lips thick, the lower without frenum. Eye not very large. Teeth moderate, conical, in about 2 series, the inner very small. Cheeks, opercles, and top of head scaly. Dorsal spines stiff and low; soft dorsal and anal rather low, pointed behind, their tips not reaching base of caudal; caudal deeply forked: the lobes pointed; pectorals and ventrals long. Dark slaty-blackish, with violet luster above; some of the scales with a greenish spot or edging; fins bluish-black; posterior part of body with small round brown spots, which form more or less regular series; soft dorsal and caudal densely spotted. Length 9 inches. Coast of California from Point Concepcion to Cerros Island; rather common in the kelp about rocks; a handsome little fish. (*punctus*, spot; *pinna*, fin.)

Ayresia punctipinnis, COOPER, Proc. Cal. Ac. Sci. 1863, 73. San Diego Bay, San Pedro, Santa Barbara. (Coll. Dr. J. G. Cooper.)

Chromis punctipinnis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 52; JORDAN & GILBERT, Synopsis, 611, 1883.

Subgenus HELIASES, Cuvier & Valenciennes.

1958. CHROMIS INSOLATUS (Cuvier & Valenciennes).

(CHAUFFE-SOLEIL.)

Head 3⅓; depth 2. D. XIII, 13; A. II, 12; scales 2½–25–9; pyloric cæca 2. Body short and deep, with short caudal peduncle; caudal fin emarginate, with the lobes rounded; second anal spine less than 2 in head. Steel brown; a curved blue streak between eyes in front, disappearing with age; many scales on upper and anterior parts of body, each with a blue spot; fins all plain, dusky; young with a dark dot behind dorsal fin. Length about 4 inches. West Indies and neighboring shores, rather common about coral reefs; rarely north to Pensacola, in deep water. Here described from a specimen from the Snapper Banks off Pensacola; a handsome little fish. (*insolatus*, warmed in the sun; from the name "Chauffe-Soleil," in use in Martinique.)

Heliases insolatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 494, pl. 137, 1830, Martinique. (Coll. Plée.)

Heliastes insolatus, GÜNTHER, Cat., IV, 61, 1862.

Chromis insolatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 285; JORDAN & GILBERT, Synopsis, 612, 1883.

1959. CHROMIS ENCHRYSURUS, Jordan & Gilbert.

Head 3⅓; depth 2. D. XIII, 12; A. II, 12 (D. XII, 11; A. II, 11, in one specimen); scales 3–26–9. Body regularly ovate-oblong, the anterior profile evenly convex; the caudal peduncle very short. Head broad above, the interorbital space flattish. Mouth small, oblique, the jaws equal, the maxillary extending little past front of eye, 3⅕ in head. Snout short, 4⅓ in head; eye very large, 2½ in head, much larger than in *Chromis chromis* or *Chromis punctipinnis*. Preorbital entire; preopercle with distinct obtuse serratures or crenations. Teeth slender, conical, in a moderate band, those of the outer series considerably enlarged, broad and blunt. Gill rakers long, not as long as pupil. Dorsal somewhat emarginate, the spines unusually high, the longest spine 1½ in head, the longest soft ray about the same; caudal lunate, not deeply forked, the lobes short, the upper lobe slightly longer, about as long as head; anal about as high as soft dorsal, its second spine 1⅔ in head; soft dorsal and anal rather high, rounded behind, reaching past base of caudal; ventrals filamentous at tip, longer than head; pectorals about as long as head; vertical fins largely covered with small scales. Color, when fresh, sooty-gray, rather dark, a narrow blue stripe from tip of snout obliquely upward and backward across upper part of eye to above front of lateral line, where it ends in blue dots; sides paler posteriorly and below; fins dusky, the distal half of anal, most of soft dorsal, and the whole of caudal and pectorals of a very intense light yellow, deepest on the caudal; ventrals dusky-bluish, slightly tinged with yellow; a small black spot in upper part of axil. Length 4 inches. Snapper Banks off Pensacola and Tampa; known from numerous specimens taken from stomachs of Snappers and Groupers. (ἔγχρυσος, deep golden; οὐρά, tail.)

Chromis enchrysurus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 286, Pensacola, Florida. (Type, No. 30871. Coll. Jordan.)

622. EUPOMACENTRUS,* Bleeker.

(PESCADOS AZULES.)

? *Parapomacentrus*, BLEEKER, Nat. Verh. Holl. Maats. Weten., II, 1877, 65 (*polynema*); lower jaw scaly; snout scaly; spinous dorsal with membrane incised and lobed.

? *Amblypomacentrus*, BLEEKER, *l. c.*, 68 (*breviceps*); snout and lower jaw naked.

Eupomacentrus, BLEEKER, Nat. Verh. Holl. Maats. Weten., II, 1877, 73 (*lividus*); snout scaly; lower jaw naked; membranes of spinous dorsal not notched.

Brachypomacentrus, BLEEKER, *l. c.*, 1877, 73 (*albifasciatus*); as above; membrane of spinous dorsal deeply notched.

Body ovate, deep and compressed, the profile steep, usually rounded. Head moderate, nearly as deep as long, the snout scaly, the lower jaw naked. Mouth quite small, terminal, the jaws equal; each jaw armed with a single close-set series of compressed, immovable teeth, which are truncate at tip. Gill rakers long; preopercle more or less serrate; preorbital serrate. Scales large, strongly ctenoid, the lateral line running parallel with the back to near the end of the dorsal fin, at which point it ceases. Dorsal fin continuous, with 12 or 13 low stout spines; membrane of spinous dorsal, usually not deeply incised nor lobed, the soft part more or less elevated, its last rays gradually shortened; lower limb of preopercle usually more or less scaly; preorbital narrow without deep notch; anal fin similar to soft dorsal, with 2 spines, of which the second is much the larger; soft rays 12 to 16; dorsal spines with a sheath of large scales, the membranes of both dorsal and anal covered high up with small scales; caudal fin more or less forked, the lobes rounded; lower pharyngeals triangular; branchiostegals 5 or 6. Species numerous, in the tropical seas. Species chiefly American, extremely variable in form and color, the brilliant coloration apparently dependent on surroundings. The species are little known and the classification of those found in the West Indies is, in default of material, largely guesswork.

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* The following is the synonymy of the closely related Old World genus, *Pomacentrus*, LACÉPÈDE, which has, as far as known, no American species: *Pomacentrus*, LACÉPÈDE, Hist. Nat. Poiss., IV, 508, 1802 (*pavo*); *Pristotis*, RÜPPELL, Neue Wirbelthiere Fische (*cyanostigma*); *Pseudopomacentrus*, BLEEKER, Naturh. Verh. Holl. Maatsch. weten. 1877, 39 (*littoralis*); teeth acutely angulated at tip.

Eupomacentrus, as understood by us, differs from *Pomacentrus* chiefly in having but 1 series of teeth in each jaw. In *Pomacentrus* an inner series of a few teeth is present. *Parapomacentrus* and *Amblypomacentrus* differ from *Eupomacentrus* chiefly in the different scaling of the head. This is a minor character, and perhaps all 3 should be united under the oldest name, *Parapomacentrus*.

The following analysis of species has very little value. Perhaps all our Atlantic species (omitting *planifrons*) are reducible to 2, *fuscus* and *leucostictus*, and these 2, if really distinct, can not always be separated with certainty; *leucorus* and *flavilatus* are certainly distinct from *fuscus*, and thus far we have found *rectifrænum* also distinguishable. Our species, so far as known, all belong to the section *Eupomacentrus*, which is regarded by Bleeker as a genus distinct from *Parapomacentrus*, being chiefly distinguished by the naked lower jaw. Perhaps the 2 genera should be united; but not having seen specimens of *Parapomacentrus*, we hesitate to place our species in it, though they evidently should not be left in *Pomacentrus*. (εὔ, genuine; *Pomacentrus*, which is from πῶμα, opercle; κέντρον, spine.)

- *a.* Upper anterior profile of head arched.
  - *b.* Depth of body moderate, $1\frac{3}{4}$ to $2\frac{1}{4}$ in length, without caudal.
    - *c.* Lower posterior half of body dark, like the anterior half; caudal fin mostly dusky.
      - *d.* Pectoral fin with a broad white edge. LEUCORUS, 1960.
      - *dd.* Pectoral fin not edged with white.
        - *e.* Depth of body $1\frac{3}{4}$ in length of body (without caudal); sides with faint cross streaks. ADUSTUS, 1961.
        - *ee.* Depth of body 2 to $2\frac{1}{4}$ in length.
          - *f.* Opercle without distinct dark spot; caudal not tipped with orange.
            - *g.* Anal without distinct blue spot in its posterior axil, except in young.
              - *h.* Head with few, if any, small accessory scales.
                - *i.* Base of pectoral with one black spot. FUSCUS, 1962.
                - *ii.* Base of pectoral with two black spots. DIENCÆUS, 1963.
              - *hh.* Head with very many small accessory scales, especially on forehead and front of opercle. RECTIFRÆNUM, 1964.
            - *gg.* Anal with a bluish spot at base of last ray; head and fins much spotted with blue. ANALIS, 1965.

ff. Opercle with a distinct dark spot above; pectoral with a dark spot; tips of all the fins orange. OTOPHORUS, 1966.

cc. Lower posterior half of body unlike anterior part, being more or less abruptly bright yellow; caudal fin bright yellow; usually a blue spot at base of last ray of anal.

j. Region below lateral line with many blue spots. LEUCOSTICTUS, 1967.

jj. Region below lateral line with few blue spots or none.

k. Sides of back with two round dusky spots on each side. FLAVIVENTER, 1968.

kk. Sides of back without round dusky spots as above; dorsal, in young, with a conspicuous ocellus; colors very brilliant. FLAVILATUS, 1969.

bb. Depth of body about 2¾ in length; posterior half of body yellowish; fins with more or less yellowish. PARTITUS, 1970.

aa. Upper anterior profile of head straight, not arched; body and fins mostly dusky, with pale spots. PLANIFRONS, 1971.

Subgenus EUPOMACENTRUS.

1960. EUPOMACENTRUS LEUCORUS (Gilbert).

Head 3⅓; depth 2. D. XII, 16; A. II, 13; lateral line with 20 pores, 7 to 9 crossrows of scales behind its end. Posterior margin of preopercle and lower edge of suborbital ring serrulate; second anal spine very strong, measured from base of sheath much higher than any of the dorsal spines, and as high as highest soft anal ray, its length contained 1½ times in head; margin of anal rather bluntly rounded; the soft dorsal pointed, but not much produced, the longest ray 1⅓ in head; caudal lunate, the lobes very bluntly rounded, the upper longer than the lower; ventrals with the outer ray produced, reaching past vent; pectorals broad, rounded, 1⅐ in head. Interorbital region transversely convex; anterior profile arched, a slight depression usually to be recognized on nape and on snout. Head and sides brown, darker on the upper half of body; no blue spots or lines, and no yellow; caudal peduncle brown like rest of body; all the fins jet-black, the pectorals abruptly margined behind with pure white. Numerous specimens, 4½ to 5½ inches long, were taken at Socorro Island, one of the Revillagigedo group, off the coast of Mexico by Gilbert and later by McGregor; a well-marked species, well separated from the others. (λευκός, white; ὄρος, margin.)

Pomacentrus leucorus, GILBERT, Proc. U. S. Nat. Mus. 1891, 554, Socorro Island. (Coll. *Albatross.*)

1961. EUPOMACENTRUS ADUSTUS (Troschel).

Depth 2½ in total length with caudal; eye 3½ in head, equal to snout. D. XII, 14; A. II, 13; preorbital and suborbital finely toothed; caudal forked, the lower lobe shorter. Brown, tinged with violet, crossed by darker vertical lines formed by edges of the scales; a black point in the axil at the upper base of the pectoral; no dark scapular spot, no white spot at base of last anal ray; head and base of anal with some sky-blue points; young with ocellus on base of the soft dorsal; some specimens with caudal yellowish brown, as also pectoral, ventral, and tip of the anal; intermediate between *E. otophorus* and *E. xanthurus*. Length 3½ inches. Cuba

(Poey; description of *P. obscuratus*); a doubtful species, perhaps differing from *E. fuscus* in the more elongate body. (*adustus*, scorched.)

Pomacentrus adustus, TROSCHEL,* in J. W. von Müller's Reisen in Mexico, etc., 633, 1865, Mexico.

Pomacentrus obscuratus, POEY, Enumeratio, 101. 1875, Havana.

1962. EUPOMACENTRUS FUSCUS (Cuvier & Valenciennes).

(MARIA MOLLE.)

Head $3\frac{1}{3}$; depth 2 to $2\frac{1}{4}$ without caudal; eye 3 in head; snout 3. D. XII, 13 to 15; A. II, 13; scales 3-28 to 30-9. Body compressed, dorsal and ventral outlines similar, profile convex, more so between the eyes; maxillary scarcely reaching vertical from front of orbit; posterior margin of preopercle and inferior margin of suborbital ring serrulated. Gill rakers small and weak, about 8 on lower part of anterior arch; tips of pectorals scarcely reaching the vent; ventrals reaching to or slightly past vent; head with very few, if any, small accessory scales. Older examples ($4\frac{1}{2}$ inches) have shorter ventrals, more prominent serrations on preopercle, a deeper body and lighter and more uniform color than smaller specimens (3 inches in length). Color dark brown to nearly black, edges of scales darker, forming narrow vertical cross bars more distinct in smaller specimens (3 inches in length); fins all dark brown to black, a black axillary spot, a few obscure white dots on head and about base of anal; no white spot on last anal rays. Very young with an ocellus on dorsal fin, and a dark spot on caudal peduncle behind soft dorsal. In none of our specimens is the caudal yellow. West Indies and coast of Brazil; north to Key West, about coral reefs; common and variable; the specimens above described from Bahia. A specimen from Key West has more blue spots. It seems to correspond to *Pomacentrus atrocyaneus*, which species we can not separate from *Eupomacentrus fuscus*. (*fuscus*, dusky.)

Pomacentrus fuscus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., v, 432, 1830, Brazil (Coll. Delalande); GÜNTHER, Cat., IV, 31, 1862; JORDAN, Proc. U. S. Nat. Mus. 1890, 323.

Pomacentrus variabilis, CASTELNAU, Anim. Nouv. ou Rares, Poiss., 9, pl. 3, fig. 3, 1855, Bahia (Coll. Castalnau); figure showing caudal brownish-yellow.

Pomacentrus atrocyaneus,† POEY Memorias, II, 190, 1860, Havana. (Coll. Poey.)

1963. EUPOMACENTRUS DIENCÆUS, Jordan & Rutter.

Head $3\frac{1}{5}$; depth 2; eye $3\frac{2}{5}$ in head; D. XII, 15; A. II, 13; scales 4-28-9. Body elliptical, the dorsal and ventral outlines about equally curved; snout short, not projecting; maxillary reaching vertical from anterior margin of orbit; eye placed above premaxillary; suborbital with 1 row of scales, finely serrate behind middle of eye; 4 rows of scales on cheek; preopercle finely serrate on upper limb, the serræ somewhat larger at angle, a few on lower limb near angle; opercle with 2 obtuse points; lateral line ceasing under third to fifth ray of soft dorsal, with 17 to 19 scales; margins of spinous dorsal nearly horizontal behind third spine, the last and highest spine being $1\frac{3}{4}$ in head; soft dorsal somewhat higher, pointed, the eighth and highest ray $1\frac{1}{6}$ in head; anal similar to soft dorsal, its highest ray $1\frac{2}{5}$ in head; tip of soft dorsal extending beyond that of anal, almost to middle length of caudal; caudal forked, the lobes rounded, the upper a little longer than head, $\frac{1}{6}$ longer than lower, middle rays of fin $1\frac{2}{3}$ in longest; ventrals slightly filamentous, extending beyond origin of anal, slightly longer than the upper caudal lobe; least depth of caudal peduncle greater than its length, $2\frac{1}{6}$ in head; a row of scales on the membrane of every ray in the vertical fins, those on spinous dorsal larger and extending nearly to margin, those on soft portions of vertical fins smaller (the rays being close together) and extending about halfway to margins; axillary scale of ventral not much developed. Nearly uniform dusky, the tips of the scales lighter, thus forming more or less distinct vertical streaks of light and dark; fins uniformly black; a dark spot at upper base of pectoral and another at lower; opercle darker than surrounding parts; a few very faint light points below eye. The specimens here described have been compared with specimens of *Eupomacentrus fuscus* of similar size, from Albrolhos Islands, Brazil, to which species they are most closely related. Our specimens have the caudal more deeply forked, the dorsal and anal higher, the vertical fins less densely scaled, the axillary scale shorter, much longer ventrals, the caudal and pectorals not lighter than other fins, and two dark brown spots at base of pectoral and the axil entirely black. Jamaica; types, 2 specimens, 4 inches long, No. 4969 L. S. Jr. Univ. Mus. (*δίς*, two; *ἐνκαίος*, branded.)

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* The following is the substance of the original description of this species: Depth $2\frac{1}{4}$ in total with caudal (about $1\frac{3}{4}$ without). D. XII, 15; A. II, 13; P. 19. Interorbital ring convex: upper profile of head arched; suborbital ring, excepting the first bone, dentate; ventral produced, its filamentous ray not reaching the anal; caudal emarginate with rounded lobes. Color brown, with vertical bars extending downward and somewhat forward, corresponding to the edgings of the scales; fins all brown: the pectoral blackish; a few faint pale spots on the suborbital ring, and on the dorsal and anal fins; a black spot on back of tail and one in axil of pectoral. Coast of Mexico. (Troschel.)

† *Pomacentrus atrocyaneus*, Poey. Form rather more slender than in *Pomacentrus otophorus*, its height 3 in total length, the head $4\frac{1}{2}$; eye $3\frac{1}{2}$ in head: maxillary reaching front of the eye; blackish blue, with many blue spots below the eye and on the cheeks, and sometimes on the back; upper lobe of the caudal a little yellowish; a large, black point at the base of the pectoral above. Length 100 mm. Cuba (Poey). (*ater*, black; κυάνεος, blue).

Eupomacentrus diencœus, Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 116, Jamaica. (Coll. Roberts.)

1964. EUPOMACENTRUS RECTIFRENUM (Gill).

(Pescado Azul.)

Head $3\frac{1}{8}$; depth 2; D. XII, 13; A. II, 13; scales 3-28-9; eye $4\frac{1}{5}$; snout $2\frac{3}{5}$; dorsal lobe $1\frac{2}{5}$; upper caudal lobe $1\frac{2}{5}$; ventrals $1\frac{1}{8}$; pectorals $1\frac{7}{8}$. Preorbital and preopercle strongly serrate. Teeth firm, flattened, not notched. Caudal lunate, the upper lobe the longer; dorsal and anal rounded in the adult, angular in the young; ventrals filamentous, reaching front of anal; pectoral reaching vent. Gill rakers short, slender, weak, numerous, about 10 on the lower limb; scales on head with numerous small accessory scales wedged in between the others, especially on top of head and on opercle.

"The color in extreme youth, as represented in a specimen 8 lines long, is reddish brown, with blue lines obliquely crossing each scale, and forming as many subvertical, scarcely interrupted blue lines crossing the body as there are rows of scales. On the back and lower part of the anterior soft dorsal is a large ocellus, and behind the fin is a smaller one. The head above has 2 very distinct blue lines continued from the snout over each eye, where they are most distant, and again approximating and continued, 1 on each side of the base of the dorsal fin, but under the fin rather broken into a linear row of spots; another line crosses the eyeball above, and behind the upper angle of the orbit is a line which is continued to the row of scales above the lateral line; a bar crosses the preorbital; a line runs along the suborbital chain; another line extends backward from the corner of the mouth, and under the suborbital one, and a blue line colors the upper lip. On each of the opercular scales is a bluish blotch. The dorsal and anal fins are spotted with blue, a spot existing on each scale, and a blue bar crosses the base of the last anal rays. The caudal is brownish, as are also the pectorals. The ventrals dark, and the spine outside bluish, like the front of the anal.

"These colors are retained until the fish has attained a length of more than 2 inches, the chief change being effected by the slightly greater isolation of the spots on the rows above the lateral line, so as to break their continuity as lines; and especially in the fading away of the blue ring and ocellus of the dorsal, which has then become very faint and is the first to disappear. Finally, in the very aged individuals, more than 3 inches long, the color of the body and scaly portion of the fins has become almost a uniform brownish chestnut, and very indistinct traces of the lines on the upper surface and sides of the head are perceptible. The naked portions of the dorsal and anal, as well as the ventral fins, are very dark, and the pectorals yellowish. The profile is also apparently steeper and more convex, and the body more obese.

"This species undergoes great change with age, and on two suites of specimens two nominal species were formerly based, the author having been deceived by the comparatively long retention of the colors of the young in several individuals, and the early assumption of the adult state by others.

"In studying the development of this species, I have had before me not less than 32 individuals, exhibiting every gradation from the specimen 8 lines long to 1 nearly 3½ inches long." (Gill.)

Our specimens confirm this excellent account. On comparison of this species with *E. fuscus*, the only constant difference we note is that of the increased number of small accessory scales about the head, and the somewhat broader preorbital of *Eupomacentrus rectifrænum*. Length 6 inches. Cape San Lucas to Panama; abundant in rock pools; a beautiful little fish. (*rectus*, straight; *frænum*, bridle.)

Pomacentrus rectifrænum, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 148, Cape San Lucas (Coll. Xantus); GÜNTHER, Cat., IV, 26, 1862; GILL, Proc. Ac. Nat. Sci. Phila. 1863, 215; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 365, 377.

Pomacentrus analigutta, GÜNTHER, Cat., IV, 27, 1862, Cape San Lucas. (Coll. Xantus.)

1965. EUPOMACENTRUS ANALIS (Poey).

Head 3⅓; depth 2 (2⅗ in total). D. XII, 14; A. II, 12; scales 3–28–10. Body rather deep, the anterior profile much convex; interorbital space strongly convex; eye longer than snout, 3½ in head. Preorbital and preopercle sharply serrate. Caudal well forked, the upper lobe the longer, especially in males. Lower limb of preopercle scaly. Head except snout scaly. Sooty blue-black in life, not paler below; each scale of back and sides with an inconspicuous bronze-olive spot; a faint paler band around caudal peduncle; head with small spots of sky-blue, those before eye oblong; iris blue and gilt; spinous dorsal with blue and with bronze spots; soft dorsal with fine blue points; dorsal with a submarginal band of paler; this band on spinous dorsal formed of 2 oblique yellowish stripes with a bluish stripe between them; caudal black, paler at tip, its base with blue spots; anal black, with blue points at base; a whitish spot at base of last ray; a conspicuous black spot at base of upper pectoral rays; no black blotch on back of tail. Length 4 inches. Here described from specimens from Key West; the species perhaps not distinct from *Eupomacentrus leucostictus*. (*analis*, from the pale anal spot.)

Pomacentrus analis,* Poey, Synopsis, 327, 1867. Havana.
Pomacentrus obscuratus, Jordan, Proc. U. S. Nat. Mus. 1884, 133, in part; description of males from Key West; not of Poey.

1966. EUPOMACENTRUS OTOPHORUS (Poey).

Head 3¼ (4 in total); depth about 2 (2⅔ in total). D. XII, 14; A. II, 12; scales 3–27–9. Vertebrate 11 + 15 = 26. Profile oval; the line of the forehead steep; snout short; maxillary reaching halfway to the eye; suborbital and preopercle serrated; caudal lunate, the upper lobe the longer; pectoral rounded. Color brown; all the head, except the opercle, blackish, as well as all the fins, of which the points are orange; a black spot on the trunk of the pectoral, another on the opercle above. Length 5¼ inches. Cuba (Poey.) Not seen by us. (*οὖς*, ear; *φορέω*, to bear; from the dark spot on the opercle.)

Pomacentrus otophorus, Poey, Memorias, II, 188, 1860, Havana.

1967. EUPOMACENTRUS LEUCOSTICTUS (Müller & Troschel).

(Beau Gregory; Cockeye Pilot; Black Pilot.)

Head 3⅓; depth 2¼. D. XII, 13 to 15; A. II, 12 to 14; scales 3–29–9. Body compressed, dorsal and ventral outlines similar, profile convex, convexity more prominent in interorbital space; mouth moderate, maxillary scarcely reaching vertical from front of orbit; diameter of eye 3⅓ in head, greater than the length of the snout; preopercle serrate; suborbital ring denticulate in adults (3½ inches), smooth in the young. Color in life, dark olive-brown anteriorly, clear yellow, with pearly reflections on sides and below; the caudal peduncle and fin rich golden yellow; head olive above, golden below, the colors changing insensibly; head with numerous spots of dark blue, closer set above; those before eye and on snout oblong, stripe-like; these spots appear black in life, but in spirits they become intense sky-blue, and ultimately fade to whitish; each scale of back above lateral line anteriorly with a vertically oblong stripe of dark blue; behind and below these, many scales have each a round point of deep violet; one row of these on upper edge of caudal peduncle on each side, and three partial series below lateral line; dorsal bluish-black, each scale with a blue point; last rays of soft dorsal yellow; a black point at base of last ray; a large blackish blotch on middle of first soft rays in the young; spinous dorsal with a marginal pale band made of 2 narrow stripes of bluish, and 2 of dull orange; anal golden yellow, its edge dusky, traces of a pale spot at base of last ray; pectoral yellow, a conspicuous blue spot at base above; ventrals yellow, tinged with bluish; a blackish blotch on middle of base of lower jaw. About rocks and reefs in clear, rather deep water; not rare. West Indies north to the Snapper Banks of west Florida; common; a handsome fish, apparently distinct from *E. fuscus*, but not always easily distinguished.

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* *Pomacentrus analis*, Poey. Depth 2⅔ in total length; eye 2⅔ in head, as long as snout; lower opercular spine very distinct; preopercle and suborbital toothed. Color dark brown with blue points on the sides of the head, some along the trunk and many along the median vertical fins; tip of the dorsal and whole of the caudal brownish yellow; anal blackish; the other fins washed with dusky; a bright point at the base of the anal ray; young with a black ocellus bordered with sky blue along the soft dorsal; older individuals with 2 blue lines between the eyes. Havana. (Poey.)

A specimen in good condition from Pensacola is thus described (under the name *Pomacentrus caudalis*): Head 3½; depth 2⅙. D. XII, 14; A. II, 13; scales 4–29–9. Form oblong-ovate; the anterior profile moderately convex. Preorbital and preopercle well serrated. Teeth moderate, entire. Soft parts of dorsal and anal rather high. Upper parts dusky; the greater part of each scale of a light grayish-blue; lower parts bright yellow, with some blue spots on the scales; top and sides of head similarly marked with bluish spots on the scales; a jet-black, ink-like spot, ocellated with blue on the back of the tail; dorsal fin colored like the back; the posterior soft rays abruptly yellow; caudal fin bright yellow, lower fins chiefly yellow.

We have also the following notes on a specimen from Bahia, also called "*caudalis:*" it is very slightly more elongate than *E. fuscus*. Its coloration is largely yellow, the fins not black; blue points on head, base of caudal and anal; axil dark; a black blotch on dorsal and 1 on back of caudal peduncle larger than in the young of *fuscus* and less ocellate. The forehead is less decurved, and there is a white dot at base of last anal ray. Perhaps *caudalis* (=*leucostictus*) also is one of the protean forms assumed by *fuscus*, and it may be that *Pomacentrus pictus* of Castelnau, brown, with the caudal mostly yellow, is one of the forms of the same fish.

(*λευκός*, white; *ςτικτός*, spotted.)

Pomacentrus leucostictus.[*] MÜLLER & TROSCHEL, in Schomburgk's Exc. Barbados, 674, 1848. Barbados; GÜNTHER, Cat., IV, 31, 1862; JORDAN & GILBERT, Synopsis, 610, 1883; JORDAN, Proc. U. S. Nat. Mus. 1884, 133; JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1888, 552.

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[*] "*Pomacentrus leucostictus.* Müll. et Tr. nov. spec. D. 12–15; A. 2–13. Black Pilot. Beau Gregory.

"This species agrees with *P. fuscus* of Cuvier et Valenciennes; it distinguishes itself, however, by numerous white dots, which are especially abundant beneath the dorsal and above the anal fin, where one is placed on each scale." (Müller & Troschel.)

In the younger individuals the white dots are much more distinct, and this may have induced the fishermen to give them the name of Beau Gregory; the full-grown specimen is called Black Pilot.

Pomacentrus caudalis,[*] POEY, Synopsis, 328, 1867, Havana, young; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 545; JORDAN, Proc. U. S. Nat. Mus. 1890, 325.
Pomacentrus xanthurus,[†] POEY, Memorias, II, 190, 1860, Havana.
Pomacentrus dorsopunicans,[‡] POEY, Synopsis, 328, 1867, Havana.

1968. EUPOMACENTRUS FLAVIVENTER (Troschel).

Depth 2¾ in total length with caudal (about 2¼ without). D. XII, 16; A. II, 13; P. 20. Interorbital space convex, the upper profile curved; only posterior part of suborbital ring dentate; ventrals long, the filamentous tips reaching tip of first anal spine. Color above brown, passing into yellowish below; bluish white dots only on the head above and on dorsal; points of dorsal, pectoral, ventral, anal, and caudal yellow; side below lateral line with some 20 straight dark streaks, corresponding to the edges of the scales as in *E. fuscus*; no white points below lateral line; a faint round dark spot just below lateral line under seventh and eighth dorsal spines; a similar one under base of first 3 soft rays of dorsal; a distinct black spot on back of tail. Atlantic coast of Mexico. Length 2½ inches. (Troschel.) Probably identical with *E. fuscus*. (*flavus*, yellow; *venter*, belly.)

Pomacentrus flaviventer, TROSCHEL, in J. W. von Müller's Reisen in Mexico, etc., 633, 1865, Atlantic Ocean.

1969. EUPOMACENTRUS FLAVILATUS (Gill).

(PESCADO AZUL DE DOS COLORES.)

Head 3⅕; depth 2. D. XII, 15; A. II, 13; scales 29; eye in head 3½; pectoral in head 1⅙; ventral in head 1; longest dorsal spine 2; second anal spine 2. Body deep, robust; anterior profile more or less convex and broad; general appearance of *E. rectifrænum* from which this seems to differ only in color. No blue spots even in specimens 3 to 5 inches long; posterior part of body, especially pectoral and caudal, light yellow; rest of body paler than in *rectifrænum* but color variable; ventrals black; dorsal and anal dusky, more or less pale posteriorly; pectoral with a very distinct black spot at base of upper rays. *E. rectifrænum* has the tail and caudal as dark as other fins, which is not the case in *flavilatus*. Here described from numerous specimens from Socorro Island, 2 from Clarion Island, and 1 from San Benidicto Island, the largest about 5 inches long. This is probably the adult of the species of which the very young has been named *flavilatus*. The coloration of the young is thus described by Dr. Gill:

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[*] *Pomacentrus caudalis,* POEY. Dark brown; caudal and posterior half of dorsal and anal brownish yellow; sky-blue spots on sides of head and front of body; ocular spot on dorsal surrounded with sky-blue; a similar ocellus on back of caudal which distinguishes it from *analis*. Length 2 inches. Havana. (Poey.)

[†] *Pomacentrus xanthurus,* POEY. Form of *P. otophorus*, the profile of the head less rounded; maxillary reaching in front of the eye, which is 3½ in head; serrations on the head weaker; color brown, black above, yellow below; pectorals and ventrals orange, as is the caudal and the point of the dorsal; ventral filament carmine; a black spot at the base of the pectoral above; the edges of the scales darker. Cuba. (Poey.) Length 4 inches. (ξανθός, yellow; οὐρά, tail.)

[‡] *Pomacentrus dorsopunicans,* POEY. Body oblong; color black, shining blue in life; tail yellow; an ocular spot on dorsal fin. Length 1¾ inches. Havana. (Poey.) (*dorsum*, back; *punicans*, blushing). The species, "owes its specific name to the fact that the upper and anterior part of the head and back are reddish, the same as the corresponding part of the dorsal."

"This species, so far as known, undergoes little change during its progress to adult age. The color above the lateral line, and on the scaly portion of the dorsal fin before the middle of its soft part, is dark brown, with blue on the center of each scale, while a large ocellus, very dark blue, margined with light, adorns the back and the dorsal fin between the last spine and the sixth ray; and a small ocellus is on the back of the tail behind the dorsal fin. Below the lateral line and behind the dorsal ocellus, the color is brownish-yellow, darker in front along the margins of the scales, and with an indistinct bluish dot in the center of each scale, except on the caudal peduncle, where they are absent. The head above has 2 blue lines, 1 on each side, continued from the snout backward on the nape; another line is continued from the upper angle of the orbit to the row of scales above the lateral line. A bar crosses the preorbital and a line interrupted passes along the suborbital chain; a bar is behind the ends of the maxillary. The scales on the cheeks and opercula are dotted with blue. The dorsal fin, behind its produced rays, as well as the anal, caudal, pectoral, and ventral fins are yellowish; the former faintly marked with blue on its scales, and margined in front with dusky; the ventrals are likewise margined on their outer edges with dusky."

A specimen from a rock pool at Mazatlan was colored as follows: An irregular line from snout below eye to soft dorsal divides the fish into 2 parts; below this line all is brilliant yellow with an orange shade, deepest on anal; above, all is the brightest sky-blue; scales darker, but all edged with sky-blue, 6 sky-blue stripes on upper part of head; an indigo spot on base of first ray of soft dorsal and last dorsal spines, extending on back, this surrounded by a ring of sky-blue; a similar smaller ocellated spot on back of caudal peduncle. Length ¾ inch.

Cape San Lucas to Mazatlan and beyond; very abundant in rock pools; the most brilliantly colored small fish in Mexican waters. Except for the marked difference in color, the species can scarcely be separated from *E. rectifrænum*, an equally abundant inhabitant of the same waters. We find, however, no intermediate forms, the 2 species seeming to be perfectly separated. It may be noted that a third inhabitant of the same rock pools, *Microspathodon bairdii*, has almost exactly the coloration of *Eupomacentrus flavilatus*. (*flavus*, yellow; *latus*, side.)

Pomacentrus flavilatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 148, Cape San Lucas (Coll. Xantus); (GILL) GÜNTHER, Cat., IV, 27, 1862; GILL, Proc. Ac. Nat. Sci. Phila. 1863, 215; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 365.

1970. EUPOMACENTRUS PARTITUS (Poey).

Height 3½ in total length with caudal (about 2¾ without). Color dark brown, with posterior half of the trunk yellowish, as also the border of the tips of the soft dorsal and anal; caudal yellowish, blue posteriorly; pectoral orange, less so at base; rays of the fins dusky; whole soft dorsal sometimes yellowish. Length 3 inches. Cuba. (Poey.) A doubtful species not seen by us. (*partitus*, divided.)

Pomacentrus partitus, POEY, Synopsis, 327, 1867, Havana.

1971. EUPOMACENTRUS PLANIFRONS (Cuvier & Valenciennes).

(PETITE JAQUETTE.)

Depth 2⅓ in total length with caudal. D. XII, 15; A. II, 13; scales 3-29-10. Profile from snout to nape nearly straight, interorbital space flat; preorbital ring serrate posteriorly only; caudal peduncle very short; dorsal and anal lobes pointed. Brown with a black spot at base of pectoral on axil and extending on fin; a black spot behind dorsal on caudal peduncle; many pale spots on side of anal. (Günther; Cuvier & Valenciennes.) Length 3 inches. West Indies; recorded from Jamaica and Martinique; little esteemed and abandoned to the negroes. Not seen by us. (*planus*, plane; *frons*, forehead.)

Pomacentrus planifrons, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 431, 1830, Martinique (Coll. M. Plée); GÜNTHER, Cat., IV, 33, 1862.

623. NEXILARIUS, Gilbert.

Nexilarius, GILBERT, in JORDAN & EVERMANN, Check-List, 512, 1896 (*concolor*); misprinted *Nexilaris*.

This genus is very close to *Abudefduf* and especially to the section called *Euschistodus*, from which it differs in having the broad suborbitals entirely adnate to the cheeks, as in *Lepidozygus*, and covered by scales so that the outlines can not be traced without dissection. One species known. (*nexilis*, bound down.)

1972. NEXILARIUS CONCOLOR (Gill).

Head 3⅓; depth 1¾. D. XIII, 12; A. II, 10; scales 4-26-10, 21 pores. Body broadly ovate, the anterior profile forming a steep and nearly even curve from the snout to front of dorsal; interorbital space convex, rather broader than eye, which is 3½ in head; snout 3 in head; preorbital broad, not notched, its least depth at angle of mouth 5 in head, its greatest vertical depth 5⅓; suborbital broad, completely covered by scales, its edge not free and to be ascertained only by dissection; lower lip with a broad free margin without median frenum; teeth rather broad, deeply notched; preopercle entire, with a shallow concavity behind; dorsal spines rather low, the fifth highest, 2 in head; soft dorsal and anal moderately elevated; upper lobe of caudal longest and broadest; pectorals as long as head; ventrals a little longer, filamentous at tip. Color dusky olive, nearly plain, with traces of 6 broad dusky cross shades corresponding to those in *Abudefduf declivifrons* but much fainter; some faint olive streaks along the rows of scales; fins all largely dusky; a black spot, broadest above, growing narrow below, on upper half of base of pectoral; breast sometimes with dark streaks. Length 8 inches. Pacific coast of Central America, rather common. Here described from specimens taken by Dr. Gilbert at Panama. The species strongly resembles *Abudefduf declivifrons*, but has the preorbital decidedly broader, the dorsal spines lower, the black cross bands much fainter, the interorbital space more convex, the anterior profile more evenly rounded, the snout shorter and lower, besides the generic character of the adnate preorbital. (*concolor*, uniformly colored.)

Euschistodus concolor, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 145, Panama. (Coll. Capt. J. M. Dow.)

624. ABUDEFDUF,* Forskål.

(Pintanos.)

Abudefduf, Forskål, Descr. Anim., etc., 59, 1775 (*sordidus*).
Glyphisodon, Lacépède, Hist. Nat. Poiss., IV, 542, 1803 (*moucharra*).
Euschistodus, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 145 (*declivifrons*).
Glyphidodon, corrected spelling.

Body deep, compressed, covered with large ctenoid scales; snout without scales; preopercle and preorbital entire, the lower limb of preopercle scaleless; 3 to 4 rows of scales between lateral line and dorsal; teeth compressed, fixed, more or less distinctly emarginate, in 1 series in each jaw, those below occupying most of the free edge of the jaw; jaws subequal. Dorsal usually with 13 spines, the last slightly shorter than the median ones; branchiostegals 5 or 6; pyloric cæca 3. Lower pharyngeals triangular. Species numerous; often brightly colored; about coral reefs in the tropical seas. We exclude from this genus all the species formerly referred to *Glyphidodon*, in which the teeth are in more than 1 series, and also those in which the snout is scaly, or the lower pharyngeals not triangular. For these forms different generic names, *Hemiglyphidodon*, *Amblyglyphidodon*, *Glyphidodontops*, etc., have been defined by Bleeker. The genus *Stegastes* Jenyns (*imbricatus*) is also very close to *Abudefduf*, but it seems to have entire teeth, and the snout and fins are densely scaly. The genus *Nexilarius* is less closely related to *Abudefduf*.

(*abu-defduf*, Arabic † name of the type of the genus, *Chætodon sordidus* ‡ Forskål.)

I. Preopercle entire.

Glyphisodon (γλυφις, incised; ὀδούς, tooth):

- *a.* Preorbital very narrow, its least breadth less than pupil, even in adult; anterior profile of head nearly straight, the snout rather acute; dorsal spines 13; anal with about 12 soft rays.
  - *b.* Scales about 4–30–11; green, with about 6 dark-blue or blackish cross bands; depth $1\frac{3}{4}$ to 2 in length; anal rays II, 12. SAXATILIS, 1973.

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* There seems to be no good reason, except its odd form, for rejecting the Arabic name given by Forskål to this genus. The diagnosis given by this excellent author is very pertinent, and the basis of the name is the same as that of *Acanthurus*. Under the head of *Chætodon*, Forskål observes:

"Genus hoc subdivisionem admittit: (*a*) Chætodon: dentibus filiformibus, brevibus, numerosis, multorum ordinum, densis, acutis, interioribus sensim minoribus. P. Br. radiis 6. Spinæ P. A. 3. (*b*) Abu-defduf: dentibus maxillaribus unius feriei, filiformibus, contiguis, submobilibus, obtusis; dentibus faucium nullis; annulo subtus circa oculos. P. Br. rad. 5. Spinæ P. A. 2. (*c*) Acanthurus: dentibus unius feriei, rigidis, acutis, contiguis, vel fimplicibus vel lobatis. Cauda in utroque latere aculeo uno vel pluribus; exsorto et rigido; vel mobili et recondendo. Divisium prorsus a Chætodonte genus; aliquande propriam constituens familiam."

Abudefduf thus corresponds in general to the family *Pomacentridæ*, as *Acanthurus* to the *Teuthiididæ*, and it rests on the same basis as the latter name. Probably Forskål intended to furnish each genus with a classical name. In the publication of Forskål's posthumous notes, his editor, Carsten Niebuhr, neglected to do this, and apparently we have no alternative but to take *Abudefduf* as its author left it instead of the later *Glyphisodon*.

† The name "Abu-defduf," according to Dr. Cyrus Adler, seems to mean "Father (i. e., possessor) of sides." It would indicate a fish or an animal whose sides or flanks are prominent. To analyze it: "abu" means father, and "def," side or flank. The reduplication, "defduf," is a sort of an intensive plural.

‡ *Abudefduf sordidus* is a species with broad preorbital and anal fin with 13 to 15 soft rays.

EUSCHISTODUS (εὖ, well; σχιστός, split; ὀδούς, tooth):

- *aa.* Preorbital broad, its least breadth not less than diameter of pupil, greater than pupil in the adult; anterior profile of head more or less arched, the snout low and blunt, projecting beyond the small mouth; anal rays II, 10; coloration dull.
  - *c.* Dorsal spines 13; scales 27 or 28.
    - *d.* Color olivaceous with 5 to 7 broad darker bands; a black spot on base of pectoral. DECLIVIFRONS, 1974.
    - *dd.* Color in adult brownish, with green dots, not distinctly banded; teeth smaller, $\frac{2\ 1}{2\ 5}$ on each side. ANALOGUS, 1975.
  - *cc.* Dorsal spines 12; body with 5 dark cross bands, fainter than in *A. saxatilis;* scales about 25. TAURUS, 1976.
- II. Preopercle coarsely serrated; dorsal spines 13; scales very large, 25; body with dark cross bands. RUDIS, 1977.

Subgenus GLYPHISODON, Lacépède.

1973. ABUDEFDUF SAXATILIS (Linnaeus).

(PINTANO; COW-PILOT; COCKEYE PILOT; JAQUETA; MAJARRA RAIADA; DEMOISELLE; SERGEANT MAJOR.)

Head $3\frac{1}{5}$; depth $1\frac{3}{4}$ to 2. D. XIII, 12 or 13; A. II, 12 (11 to 13); eye 3 in head; snout 4; highest dorsal spine 2; scales 4–28 to 32–12, 21 pores. Body much compressed, back little arched, anterior profile nearly straight, interorbital area slightly convex; snout not very obtuse, the very narrow preorbital not wide as pupil; mouth moderate, the maxillary reaching to vertical from front of orbit; margin of preopercle and suborbital ring entire; cheeks and opercles scaly; eye a little wider than length of snout; snout not very blunt, the preorbital low, 2 in eye; fourth and fifth dorsal spines longest, slightly more than $\frac{1}{2}$ the length of the head; from the fifth to last dorsal spine there is a slight decrease in length; median soft dorsal and anal rays the longest, $1\frac{1}{2}$ to $1\frac{1}{3}$ in the head; pectoral fins rather long, about $\frac{1}{5}$ longer than head, reaching to tips of ventrals, which reach front of anal; pectoral about as long as head; second anal spine $1\frac{4}{5}$ in head; caudal forked, upper lobe the longer; teeth rather deeply notched. Color in life, bright pale yellowish green; sides with 5 or 6 deep indigo bands which extend on the dorsal fin and which are rather narrower than the interspaces, the first from the origin of the dorsal to the pectoral fin, the second downward from fourth and fifth dorsal spines, the third from the ninth and tenth dorsal spines toward the vent, the fourth from end of spinous dorsal to middle of anal, the fifth below the end of the soft dorsal and continued on the posterior rays of dorsal and anal; a faint sixth bar at base of caudal; dark fins violet blue; each scale on lower part of body with a pale blue spot, these forming faint longitudinal streaks on lower part of body; some golden on upper part of the body; a black spot at base of pectoral above. Length 6 inches. Tropical America, on both coasts; abundant in tide pools and about coral reefs everywhere from Guaymas to Peru and from Florida to Uruguay. We are unable to distinguish the Pacific form called *troschelii* from the common *saxatilis*. Here described from specimens from Mazatlan, Havana, and Socorro Island. (*saxatilis*, living among rocks.)

Jaguacaguare, Marcgrave, Hist. Brazil, 1648, Brazil.

Chætodon cauda bifurca, fasciis 5-*albis*, Linnaeus, Mus. Adolph. Frederici, I, 64, "India."

Chætodon saxatilis, Linnaeus, Syst. Nat., Ed. X, 276, 1758; after Mus. Ad. Fr.; Ed. XII, 466, 1766.

Chætodon mauritii, Bloch, Ichthol., III, 213, pl. 109, 1785, Brazil; on a bad drawing by Prince Maurice.

Chætodon marginatus, Bloch, Ichthol., III, 98, pl. 207, 1787, Martinique; on a drawing by Plumier.

Glyphisodon moucharra, Lacépède, Hist. Nat. Poiss., IV, 542, 1803, Brazil, etc.; after various authors.

Chætodon sargoides, Lacépède, Hist. Nat. Poiss., IV, 453, 1803, Martinique; on a drawing by Plumier.

Glyphidodon troschelii, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 150, Cape San Lucas (Coll. John Xantus); Günther, Cat., IV, 36, 1862; Gill, Proc. Ac. Nat. Sci. Phila. 1863, 220.

Glyphidodon saxatilis, Cuvier & Valenciennes, Hist. Nat. Poiss., V, 446, 1830, Gunther, Cat., IV, 35; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 366 and 377; Jordan, Proc. U. S. Nat. Mus. 1884, 134.

Subgenus EUSCHISTODUS, Gill.

1974. ABUDEFDUF DECLIVIFRONS (Gill).

Head $3\frac{1}{5}$; depth 2. D. XIII, 12; A. II, 10; eye 3 in head, equal to snout in the adult; pectorals equal to head; longest dorsal spine 2; second anal spine $2\frac{1}{6}$; scales 3–28–9. Body compressed, back much elevated, anterior profile convex, very steep, steepest from front of eye to margin of upper jaw; the rather broad preorbital usually wider than pupil, especially in the adult; snout bluntish; mouth small, maxillary not reaching vertical from front of eye, preopercle and suborbital with entire edges; preorbital unusually broad, growing broader with age. Diameter of eye greater than the length of the snout in the young 2 inches long, equal to it in examples 4 inches long; dorsal spines increase in length to 3 and 4 inches, then decrease to last spine; soft dorsal and anal with median rays moderately produced, longest dorsal ray $1\frac{2}{3}$ in head, longest anal slightly longer. Gill rakers not very closely set, about 16 below the angle; pectorals scarcely reaching tips of ventrals, which reach slightly past vent. Color comparatively dull and plain; greenish olive, mottled with light and dark; head and all of the fins except pectoral darker; 6 or 7 rather broad, dark vertical bars on sides of body, extending on dorsal fin, usually 6 before caudal peduncle, these less distinct than in *A. saxatilis*, growing obscure with age; base of each scale on lower $\frac{2}{3}$ of body with a pale spot, these forming faint, indistinct longitudinal bands; upper part of base of pectoral with a conspicuous black spot, a good diagnostic mark, varying in size, largest in older individuals; no blue, yellow, or red in life. Length 4 inches. Pacific coast of tropical America; abundant in rock pools, especially about Mazatlan, where the specimens here described were taken. (*declivis*, steep; *frons*, forehead.)

Euschistodus declivifrons, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 146, Cape San Lucas (Coll. Xantus); Gill, Proc. Ac. Nat. Sci. Phila. 1863, 220.

Glyphidodon declivifrons, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 366 and 377.

Abudefduf declivifrons, Jordan, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 476.

1975. ABUDEFDUF ANALOGUS (Gill).

Head 3; depth 2. D. XIII, 12; A. II, 10; P. 18; scales 4–26–9. Similar in form to *Abudefduf declivifrons*, the teeth smaller, 21 or 22 on each side in the upper jaw, 7 of which are in the deflected portion behind, 25 on each side in the lower jaw; produced portion of anal fin rounded rather than angular. Color purplish brown, dotted with green on the center of each scale, and with the throat and abdomen covered with a lake-colored coat. (Gill.) Atlantic coast of Central America; not seen by us. Evidently closely related to *A. declivifrons* (whence the name *analogus*, like.)

Euchistodus analogus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 219, Aspinwall. (Coll. Rev. Mr. Rowell.)

1976. ABUDEFDUF TAURUS (Müller & Troschel).

(DOVETAIL FISH.)

"D. XII, 12; A. II, 10. The teeth are notched. The cleft of the mouth does not reach the eye; on the angle of the mouth the suborbital bone is nearly as large as the diameter of the eye; the space between the eyes is nearly equal to 1½ diameter of an eye. The profile is less steep than in *G. saxatilis*, and the 5 vertical bands are less distinct in the present species. Its length is 7 inches." (Müller & Troschel.) A scarcely known species, possibly distinguished from *A. analogus* by the 12 dorsal spines,* possibly identical with *A. rudis*. (*taurus*, bull.)

Glyphidodon taurus, MÜLLER & TROSCHEL, in Schomburgk's History of Barbados, 674, 1848, Barbados. (Type in museum at Berlin).

We place here a species which, if correctly described, would seem to belong to a distinct genus. Its affinities are, however, evidently rather with the species called *Euschistodus*, and Poey's account of the serration of the preopercle may be erroneous.

1977. ABUDEFDUF RUDIS (Poey).

Head 4 in total length with caudal; depth 2¼; eye 4 in head. D. XIII, 12; A. II, 10; scales very large, 25 in lateral line. Maxillary reaching to opposite nostril; teeth in 1 row, alike in size, all deeply bifid; preopercle coarsely serrated, a flat spine on the opercle; lobes of the caudal rounded, the fin little notched; second anal spine strong; snout longer than in *A. saxatilis;* scales much larger, the pores of the lateral line not branched. Color brown, with 5 broad vertical bands before caudal, which descend from the back to the middle of the flanks, where they fade insensibly; eye blackish; fins dark brown; dark bands broad, with narrow interspaces; 1 dark band more than in *A. saxatilis*. Cuba; one female 10 inches in length. (Poey.) A little known species of uncertain relationship. If its preopercle is really serrate, it can not belong to *Abudefduf*. In other respects it would seem nearer to the latter genus than to *Eupomacentrus*. It is very likely identical with *Abudefduf taurus*. (*rudis*, rough.)

Glyphidodon rudis, POEY, Memorias, II, 191, 1860, Havana; GÜNTHER, Cat., IV, 37, 1862.

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* According to Poey the type of this species has (fide Peters, in lit.) the coloration of *A. rudis* and similarly large scales (about 25 in lateral line).

625. HYPSYPOPS, Gill.

(GARIBALDIS.)

Hypsypops, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 165 (*rubicundus*).

Body very deep, covered with rather large ctenoid scales which extend on the bases of the vertical fins; caudal peduncle short and deep; head very deep, with prominent forehead and snout; no scales before nostrils and none on lower limb of preopercle; preorbital very deep, but not so deep as in *Microspathodon*. Jaws subequal; mouth small; teeth all narrow, fixed, entire, those below covering whole edge of the jaw; caudal emarginate, with rounded lobes. One species of large size, its coloration changing with age. (*ὕψι*, high; *ὑπό*, below; *ὤψ*, eye, from the wide preorbital.)

1978. HYPSYPOPS RUBICUNDUS (Girard).

(GARABALDI.)

Head 3⅓; depth 1¾. D. XII, 16; A. II, 15; eye 4⅗ in head; snout 2½; pectoral equals head; highest dorsal spine 3; highest dorsal ray 1⅓; second anal spine 3; scales 5-30-13, 21 pores. Body short and deep, elevated and compressed, constricted behind the dorsal and anal, the caudal peduncle short and deep; head higher than long, the preorbital and suborbital regions being unusually deep; preopercle entire; cheeks, opercles, and top of head scaly, except snout and lower jaw, which are naked; mouth small; lips thick; teeth compressed, narrow, blunt, and entire, in a single row, dark at tips; gill rakers short and flexible, about 3+12; preorbital anteriorly as wide as the eye, about 4½ in head in adult; cheeks with 5 or 6 rows of rather small scales, opercles with several rows of larger ones; preorbital with small crowded scales; lips thick, the lower without frenum; soft fins rather high; pectorals reaching to tip of ventrals, nearly to vent. Adult uniform deep scarlet in life, unmarked, edges of fins dusky. The color of the young of this species is quite variable, and different from that of the adult. The following account of the coloration of the young is given by Miss Rosa Smith (now Mrs. C. H. Eigenmann):

"Hitherto only the adult form of this species has been known, and its uniform deep scarlet coloration has been considered to form a marked contrast to the coloration of the other species of *Pomacentrus*. I have lately secured numerous young specimens, and find their coloration quite different from that of the adult, and in general similar to that of the other members of this genus.

"The ground color is dusky scarlet, with numerous markings of an intensely bright blue, which occasionally changes to bluish green. Two series of elongate spots form a blue stripe on either side of the median line, between tip of snout and beginning of dorsal fin; a line of blue on superior margin of iris is followed posteriorly by an irregular series of blue spots above the lateral line (the individual spots not quite equaling diameter of iris), the last of these spots is larger than those which precede it, being ⅔ of the orbital diameter, and extends up to the base of the dorsal fin at the posterior third of the spinous portion; thence very small dots continue to the end of the dorsal fin, describing a curve which exactly outlines the extent to which scales cover the base of the articulate dorsal rays; a conspicuous blue spot or bar crosses top of caudal peduncle close to the posterior insertion of dorsal fin. One or more small blue spots at base of caudal. The spine of first ray of ventral blue; spines and tips of anterior rays of anal blue; a nearly round blue spot on posterior part of anal near its base. Sides of body more or less dotted with blue, as are also the cheeks and opercles. Pectorals and caudal semitransparent, plain reddish. Ground color of anal, bright red. Dorsal fin dusky, with minute blue dots anterior to the markings mentioned. Abdomen and under surface of the head lighter, immaculate.

"The description is made from specimens 1⅜ to 2 inches long. Specimens less than 1 inch long have the spinous dorsal almost wholly blue and all the markings larger, while an individual 3½ inches long shows the markings similarly placed but relatively smaller, and the ground color is more olivaceous.

"The fin rays are proportionately higher and the eye relatively larger than in the adult. The suborbital and preopercle are without serrations. The small opercular spine, unlike that of the mature form, is smooth and wholly without denticulations. The greatest depth of the body is about ½ the length.

"These brilliant little fishes inhabit only large, deep, rock pools, hiding under the sea-weed of ledges, and frequently swimming out into the open water of the pool. They are accompanied by the adult, the usual uniform scarlet color of which appears a distinct lusterless yellow in the water.

"The specimens described were taken at La Jolla, near San Diego."

Coast of California south of Point Concepcion; common in clear waters about rocky islands from Point Concepcion to Todos Santos Bay. A handsome fish, reaching a length of 14 inches; of some value as food. (*rubicundus*, red.)

Glyphisodon rubicundus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 148, Monterey, California (Coll. Lieut. W. P. Trowbridge); GIRARD, U. S. Pacific R. R. Sur., x, 161, pl. 29, 1858.

Hypsypops rubicundus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 165, and 1863, 218.

Parma rubicunda, GÜNTHER, Cat., IV, 58, 1862.

Pomacentrus rubicundus, JORDAN & GILBERT, Synopsis, 610, 1883; ROSA SMITH, Proc. U. S. Nat. Mus. 1882, 652; ROSA SMITH, *l. c.*, 1883, 234; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 52.

626. MICROSPATHODON, Günther.

Microspathodon, GÜNTHER, Cat. Fishes, IV, 35, 1862 (*chrysurus*).

Pomataprion, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 216 (*dorsalis*).

Body deep, compressed; head wide; mouth rather large, with transverse cleft; lower jaw shorter than upper, its teeth confined to its anterior portion; teeth in 1 series in each jaw, all movable; upper teeth narrow, entire; lower broader, also entire; preorbital very broad, with a deep notch between nostril and maxillary; lower limit of preopercle scaled; snout scaled almost to the lips; soft dorsal and anal fins with median rays elevated; caudal forked; coloration very brilliant. Herbivorous fishes of the rocky islands of the Tropics, the known species all American. (*μιϰρός*, small; *σπάθη*, sheath; *ὀδούς*, tooth.)

a. Vertical fins not elevated; caudal simply lunate; color brownish, with blue shades above, the lower half more or less abruptly yellow; each scale with a blue dot; a black spot on back of caudal peduncle; nostril large, ¼ eye in adult. BAIRDII, 1979.

aa. Vertical fins much elevated; caudal lobes falcate.

  b. Caudal fin golden yellow or orange in life; body dark brown with round spots of deep blue on head, nape, and sometimes on back. CHRYSURUS. 1980.

  bb. Caudal fin dark, like the body, not yellow.

    c. Body dark, sprinkled with blue spots like flakes of snow. NIVEATUS. 1981.

    cc. Body not covered with blue spots; nostril a small pore; vertical fins falcate; vertical fins deep blue without pale edgings; body deep blue, with 3 large, round, sky-blue spots above lateral line, 1 near its front, 1 under front of spinous dorsal, 1 under last spine; a blue saddle behind last dorsal ray—these distinct at all ages; head with blue streaks and spots. DORSALIS, 1982.

1979. MICROSPATHODON BAIRDII (Gill).

Head 3; depth 1⅗. D. XII, 16; A. II. 14; scales 3-29-10. Body short, compressed, elongated; nape abruptly produced behind and above a depression which lies above the eye, the nape thus projecting forward in a fleshy crest; anterior profile steep. with fleshy corrugations, separated by depressions; tip of snout above premaxillary enlarged to a fleshy pad under which the jaw slips, separated from preorbital and top of head by a deep crease, deeper in larger specimens. Nostril midway between eye and crest. its size much larger than in *M. dorsalis*, being ¼ diameter of eye. In *M. dorsalis* of the same size the nostril is reduced to a small pore. about ⅕ of eye. Preorbital lower than in *dorsalis*, its height 2¾ in head in adult; in *dorsalis* of the same size the preorbital is 2⅓ in head. Teeth small. truncate, movable, about as in *dorsalis:* lower jaw shorter; width of mouth 2 in head; 4 or 5 rows of scales on cheek. Caudal peduncle short and deep, length 2½ in head, its depth 2 in head; dorsal elevated but not falcate, simply angular, its longest ray 1⅓ in head: anal similar, its longest ray 1½ in head; caudal lunate, its lobes not produced, the upper longer, 1⅙ in head; pectoral 1⅕ in head; ventral 1⅓ in head. Color uniform deep blueblack without paler margins to fins except very narrow line on upper ray of pectoral and upper lobe of caudal; no spots. This species is well separated from *M. dorsalis*, differing in the much larger nostril, fleshy hump at nape, in the lower preorbital and in the uneven slope of profile, as well as the absence of falcate tips to fins. Here described from adult examples 6 to 12 inches long from Clarion Island (collected by McGregor). The very small specimens which have been named *Microspathodon bairdii* seem to be the young, having the large nostril and the non-falcate fins. The bright orange markings seem to disappear with advanced age.

The color of the young is thus described by Dr. Gill:

"The color in extreme youth, as represented by a specimen 10 lines long, is greenish yellow, modified by blue above on the middle of each scale, the margins alone being brownish; below a line drawn from the axil of the pectoral to that of the dorsal fin, the blue has disappeared, and the brownish yellow is conspicuous, sprinkled over with a few faint, darker dots, which themselves become obsolete on the abdomen and caudal peduncle; immediately behind the dorsal fin there is a dark spot, margined in front by blue. The head above has 2 blue lines continued from snout and decurved over the eye ball and behind the orbit; on the forehead there is a transverse blue bar, and on the nape 2 nearly parallel longitudinal blue lines. An oblique bar crosses the preorbital; a series of blue dots on the suborbital chain is continued to meet the deflected line behind the eye, and there is a blue bar behind the end of the maxillary. The lips and opercula are brown. The dorsal fin, on its scaly portion, including all the spinous portion, except a marginal band, and the lower half of the soft dorsal is blue, the scales scarcely being margined by brown; the other fins are colorless, except the margin of the anal, which is dark. The species, with advancing age, loses the intensity of the blue above, but the color spreads downward faintly, and is perceptible on all the scales except those of the abdomen and hinder portions of the caudal peduncle. The blue on the upper surface of the head and the preorbital finally becomes obliterated, but the series on the infraorbital chain and the bar behind the maxillary remain, while the opercle assumes blue dots. The fins also, especially the ventral and anal, have become dusky. * * * Coloration quite peculiar in the gradual spreading of the blue, while it becomes fainter at the same time with age."

Pacific coast of tropical America from Cape San Lucas to Panama; the young abundant in rock pools, with *Eupomacentrus flavilatus*, with which it has been confounded. A beautiful fish (named for Spencer Fullerton Baird).

Pomacentrus bairdii, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 149, Cape San Lucas. (Coll. Xantus.)
Microspathodon bairdii, JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 476, pl. 43.

1980. MICROSPATHODON CHRYSURUS (Cuvier & Valenciennes).

Depth 2¾ in total length with caudal; eye 3½ in head. D. XI, 15; A. II, 13. Body oval; forehead broad and depressed; maxillary reaching to the nostril; teeth below twice as large as those above. Color blackish brown, the fins darker, excepting the caudal, which is entirely orange; round spots of cobalt blue around the eyes, on the nape, and sometimes on the back and scales of the dorsal fin. (Poey.) West Indies; known from Cuba and St. Thomas. Not seen by us. (*χρυσός*, golden; *οὐρά*, tail.)

Glyphidodon chrysurus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., V, 476, 1830, St. Thomas; GÜNTHER, Cat., IV, 57, 1862.
Pomacentrus denegatus, POEY, Memorias, II, 190, 1860, Cuba. (Coll. Poey.)

1981. MICROSPATHODON NIVEATUS (Poey).

Head about 2¾ (3¾ in total); depth about 2 (2½ in total); eye 3¾ in head; maxillary reaching the front of the eye; suborbitals and preopercle without teeth. Color uniform black with large sky-blue spots, the size of a scale, like flakes of snow, regularly arranged in small number, some 20 on each side above the body, a few on the median fins. Seen once at Havana. (Poey.) Length 2 inches. A doubtful species, apparently referable to *Microspathodon*, possibly the young of *M. chrysurus*. (*niveatus*, snowy.)

Pomacentrus niveatus, POEY, Enumeratio, 102, 1875, Havana.

1982. MICROSPATHODON DORSALIS (Gill).

Head 3¼; depth 2 in length to tip of caudal rays; eye small, high, 2⅓ in preorbital width, 5 in head. D. XII, 16; A. II, 14; scales 29, with 22 pores. Body deep, compressed, the nape high and compressed, the anterior profile very steep, slightly concave in front of orbits. Head very wide and heavy below, mouth wide, transverse, its width nearly twice its lateral cleft, the maxillary reaching vertical from midway between nostril and front of eye. Maxillary almost wholly slipping under the broad preorbital, its distal half strongly U-shaped, with the convexity backward, and its anterior margin displaying a deep reentrant curve. Dentary portion of mandible consisting of an anterior transverse portion, and the 2 lateral limbs, which form about a right angle with anterior portion, and are convexly bent toward median line. It would much resemble a U with the lateral limbs convex inward instead of outward; anterior portion provided with a single series of rather firmly fixed elongate incisor teeth with truncate edges; lateral teeth similar but smaller; teeth in the upper jaw strongly compressed laterally, but with the extreme tip flattened antero-posteriorly, so as to render them narrow incisor-like; very loosely implanted, extremely movable, and in a single functional series, the teeth of which are replaced by others which appear above along front of jaw; between vomer and front of jaw is a median firm fleshy pad, with free anterior margins; a somewhat similar pad at each angle of mouth; no teeth on vomer or palatines. Nostril minute, round, midway between front of jaw and middle of orbit. Preopercle smooth or minutely crenate at the angle, none of the bones of head serrate or spinous. Gills 3½, the inner half of fourth gill developed about ¼ length of others; a small but evident pore behind fourth gill; gill rakers short and weak, not toothed, about 20 on anterior limb of outer arch; gill membranes forming a broad fold across the isthmus. Scales large, rough, vertically much deeper than wide, with numerous small accessory scales at base which become exceedingly numerous on head and nape, where they form a shagreen-like covering; lateral line little prominent, the pores opening on under surface of scales, ceasing under last rays of soft dorsal. Fins entirely enveloped in scales, which are large at base of fins, becoming minute on soft portions. Dorsal spines strong, regularly increasing, the highest 2½ in head; anal spines strong, the second but little shorter than longest dorsal spines; soft dorsal and anal fins conspicuously falcate, the median rays of fins produced beyond fork of caudal, the anterior margins stongly convex, the posterior strongly concave; longest dorsal and anal rays more than ½ length; caudal deeply forked, the lobes also greatly falcate, equaling in length the lobes of dorsal and anal; outer ventral rays produced, extending beyond front of anal; pectorals short, rounded, reaching vertical from vent. Color, uniform slaty blue or gray, the fins somewhat darker, all but the spinous dorsal narrowly white-margined; peritoneum pale. The above is a description of adult individuals (those described as *cinereus*).

Mature individuals of smaller size (*azurissimus*) have been described as follows: Head 3; depth 2. D. XII, 16; A. II, 13; eye 5 in head; snout nearly 2; pectoral 1½; highest dorsal spine 3 in body; ventral 2½ in length; anal lobe 2⅙; dorsal lobe 1¾ in body. Body compressed and deep; dorsal outline from snout to caudal peduncle uniform; breast prominent and well rounded, behind which the ventral outline is straight to anal spine, then slanting obliquely upward to caudal peduncle. Mouth wide with thick lips; the teeth flat, sharp, and movable, in a single row in each jaw, those in the upper jaw are arranged in a crescent, in the lower jaw they are in a straight line in front, but at the sides they describe nearly a right angle and run back; isthmus with a notch made by the prominence of the breast. Tip of snout, maxillary, and lower jaw naked; head everywhere else with scales, the scales on cheeks in about 5 rows; scales on body large, 3–28–9; all the fins with scales; accessory scales very few. Lateral line running high and ending under last ray of soft dorsal; gill rakers numerous, short, and weak, about 5 + 21. Pectoral short and rounded at the tip; ventrals with middle rays produced, 2½ times ventral spine, reaching past vent to anal; spinous dorsal low; with the exception of the first the spines are about equal; soft dorsal and anal falcate and filamentous, the dorsal lobe slightly the longer, not quite reaching to tip of caudal fin; caudal widely forked, the lobes falcate, the upper lobe the longer; the middle rays are contained 3½ times in the upper caudal lobe. In life, deep indigo blue, with traces of olivaceous cross shades; pectoral, dorsal, and caudal edged with bluish white; eyes violet.

The young (*dorsalis*) may be described as follows: Head 3; depth 1⅚. D. XII, 16; A. II, 14; scales 3–28–10; eye 3; snout 4¼; dorsal lobe 1⅙; caudal lobe equals head; pectoral 1⅙; ventral equals head. Body compressed, the profile rounded, depressed before eye so that snout projects. Gill rakers numerous, very short, slender, close set. Preorbital deep. Preorbital and preopercle entire. Teeth in several rows, movable. Dorsal spines rising to the last, subtruncate, flattened, each with a brown vertical streak in center, the soft rays and lobes of caudal much produced, as also ventral. Color in life, deep indigo blue on body and fins; no pale edgings; 3 round sky-blue spots above lateral line, the one near its beginning, another under front of spinous dorsal, the third under last spine, the first smallest, the other two as large as pupil; a larger sky-blue saddle in axil of soft ray; head with many sky-blue spots everywhere, those on preorbital and suborbital coalescing in a blue streak; another streak behind angle of mouth, and another above eye, nostrils, throat, and snout; axil sky-blue, a bar of sky-blue across end of snout; angle of mouth sky-blue.

The immature coloration is thus correctly described by Dr. Gill:

"In the young the color of the body is a purplish brown, varied with blue on the center of each scale, the blue diminishing on the scales of the tail toward the fin. On each side there is a blue spot on the first scale above the lateral line, on the scale above the seventh of the lateral line and below the fourth dorsal spine, and another on the one above the fifteenth scale and below the eleventh or twelfth spine; on the tail, behind the dorsal fin, there is a transverse dark band, bordered in front by blue. The head above has 2 blue lines, 1 on each side, running from and decurved over the eye behind the orbit. The forehead is indistinctly marked with blue in the center of each scale; and on the nape there are 2 oblong blue spots on each side. A continuous blue line is continued from the side of the snout along the suborbital chain, and unites with the line decurrent behind the orbit. Behind the end of the supramaxillary there is a vertical blue bar. The scales on the cheeks and opercula are spotted with blue in the center. Lips immaculate brown. The dorsal fin on its scaly portion is similar to the back; the anal has a blue spot at the base of its last rays, and its front, like the outer edge of the ventral fin, is blue. The pectoral inside has also a blue line across the base of the upper rays

"As the fish advances in age the blue on the centers of the scales fades, and, finally, the color of the whole body, as well as the scaly portions of the fins, becomes a purplish brown; but the spots on the scales above the first, seventh, and fifteenth [sixteenth] scales of the lateral line remain, as does also the one bordered before by the blue in the rear of the dorsal fin. The coloration on the head simply becomes fainter, and the lines narrower and somewhat interrupted. The fins are uniform and spotless, except the pectoral, which retains the transverse bar which was assumed in its youth. This species, in its young state, was formerly described as a *Pomacentrus*, the preoperculum having a scalloped appearance, produced by the muciferous ducts and their mouths, and thus simulating the serrature of young *Pomacentrus*, misleading Dr. Günther as well as myself, especially as it had the coloration and form of a *Pomacentrus*. The border in the old is not so much exposed, and is perfectly entire, while the preorbital has gained in elevation at the expense of the eye. The uniform color of the body is also in strong contrast to the variegated sides and fins of the young."

Length 12 inches. Pacific coast of America, from Cape San Lucas to Panama; known from Cape San Lucas, Mazatlan, the Revillagigedo Islands, and Panama. (*dorsalis*, pertaining to the back.)

Hypsypops dorsalis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 147, Cape San Lucas. (Coll. Xantus.)

Pomacentrus quadrigutta, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 149, Cape San Lucas, young (Coll. John Xantus); GÜNTHER, Cat., iv, 27, 1862; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 366 and 377.

Microspathodon cinereus, GILBERT, Proc. U. S. Nat. Mus. 1890, 71, Clarion and Socorro islands. (Coll. *Albatross*.)

Microspathodon azurissimus, JORDAN & STARKS, in Jordan, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 478, pl. 44, Venados Islands, near Mazatlan. (Types, Nos. 1610, 1636, and 2895, L. S. Jr. Univ. Mus. Coll. Hopkins Expd. to Mazatlan.)

Pomataprion dorsalis, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 216.

Microspathodon dorsalis, JORDAN, Fishes of Sinaloa, 477, 1895; JORDAN & EVERMANN, Check-List Fishes, 411, 1896.

Microspathodon dorsalis azurissimus, JORDAN & EVERMANN, *l. c.*, 411.

Microspathodon dorsalis cinereus, JORDAN & EVERMANN, *l. c.*, 411.

Suborder PHARYNGOGNATHI.*

(THE LABROID FISHES.)

Lower pharyngeals fully united; nostrils double; gills 3½, with no slit behind the last. Ventral fins thoracic, each with one spine and five rays; dorsal and anal spines not very strong; scales weakly ctenoid or cycloid; in other respects essentially as in the *Percoidea*. Species mostly of the tropical shores; most of them large fishes of strong dentition and bright colors. (*φάρυγξ*, pharynx; *γναθός* jaw, from the large jaw-like pharyngeals.)

a. Lower pharyngeals T-shaped or Y-shaped, their teeth conical or tubercular; teeth in jaws usually not confluent. Species carnivorous; the sexes often dissimilar. LABRIDÆ, CLX.

aa. Lower pharyngeals more or less spoon-shaped or basin-shaped, their teeth broadest transversely and truncate, arranged in mosaic; teeth in jaws more or less perfectly confluent, forming a sort of beak; anal spines 2; dorsal spines 9; scales very large, 22 to 25 in lateral line; vertebræ 10 or 11 + 14 = 24 or 25. Species herbivorous; the sexes colored alike. SCARIDÆ, CLXI.

Family CLX. LABRIDÆ.†

(THE WRASSE-FISHES.)

Body oblong or elongate, covered with cycloid scales; lateral line well developed, continuous or interrupted, often angularly bent. Mouth moderate, terminal; premaxillaries protractile; maxillaries without supplemental bone, slipping under membranaceous edge of the preorbital; anterior teeth in the jaws usually very strong and canine-like; teeth of the jaws separate or soldered together at base, not forming a continuous plate; no teeth on vomer or palatines; lower pharyngeals completely united into one bone, without median suture, this bone T-shaped or Y-shaped, its teeth conical or tubercular. Lips thick, longitudinally plicate. Nostrils round, with 2 openings on each side. Dorsal fin continuous, the spinous portion usually long, its spines rather slender, 3 to 20 in number, anal similar to soft dorsal, with 2 to 6 spines. Ventrals thoracic, I, 5, inserted below the pectorals (said to be subjugular in *Malacocentrus*). Branchiostegals 5 or 6; pseudobranchiæ well developed; gills 3½, the slit behind the last arch small or obsolete; gill membranes somewhat connected, sometimes joined to the narrow isthmus. Air bladder present; no pyloric cæca. Genera 60, species 450, chiefly of the tropical seas, living among rocks or kelp. Many of them are brilliantly colored, and some are valued as food-fish. Most of them feed upon mollusks, the dentition being adapted for crushing shells.

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* Professor Cope regards this suborder as the most specialized or "highest" in the group of fishes. The specialization of the Labroids is, however, reducible to 2 or 3 characters, the specialization of the pharyngeal bones, the gills, and, in general, of the pigment cells. In general, they are not less generalized than the majority of the *Acanthopteri*, and they do not depart so widely from the usual fish type as do the *Pediculati*, *Plectognathi* or *Heterosomata*.

† For synonymy and descriptions of the species of this family of fishes see "A review of the labroid fishes of America and Europe," by David Starr Jordan, in Report U. S. Fish Comm. for 1887, 599–699, pls. I–XI, first published August 26, 1891.

The *Labrinæ* are the most generalized forms, well distinguished from the others by their greater number of vertebræ, a character associated with the greater number of dorsal spines and with their northern habitat. These are the only Labroids properly belonging to the North Temperate Zone, and all but 2 of the species are European.

The *Malapterinæ* seem to be allied to the *Labrinæ*, although they may belong to some other family. The number of vertebræ has not been counted in a single known species. They belong to the South Temperate Zone, and differ from the *Labrinæ* in having most of the dorsal spines replaced by soft rays.

The *Harpinæ* are allied to the *Labrinæ*, but are chiefly tropical fishes with a reduced number of vertebræ and spines. Close to the *Harpinæ* is the small subfamily *Clepticinæ*, distinguished by the little development of the jaws and pharyngeals and by the corresponding feeble dentition.

The *Julidinæ* are the most abundant of the tropical Labroids, brilliant little fishes, abounding about banks and reefs, and having the vertebræ reduced to the normal number 10 + 14 = 24, and the dorsal spines to about 9. The *Xyrichthyinæ* are an offshoot of the *Julidinæ*, with the head more or less modified and the lateral line incomplete.

The *Scaridæ* are here placed in a distinct family. They have the normal number of vertebræ and of spines. Their pharyngeal bones and teeth are, however, modified in a very singular way, and they must be regarded as forming the most specialized type of Pharyngognathi, the suborder to which the Labroids belong.

The general rule that marine fishes found in temperate regions have an increased number of vertebræ is well shown in this group. The following table shows the numbers of vertebræ as given by Drs. Günther and Jordan in the species examined by them:

Labrus viridis, 20 + 21 = 41.
Labrus bimaculatus, 18 + 21 = 39.
Labrus livens, 18 + 20 = 38.
Labrus berggylta, 19 + 19 = 38.
Tautogolabrus adspersus, 17 + 19 = 36.
Acantholabrus palloni, 18 + 18 = 36.
Odax balteatus (Antarctic), 19 + 17 = 66.
Tautoga onitis, 16 + 18 = 34.
Ctenolabrus suillus, 15 + 18 = 33.
Crenilabrus melops, 15 + 18 = 33.
Crenilabrus tinca, 15 + 18 = 33.
Crenilabrus ocellaris, 14 + 18 = 32.
Crenilabrus cinereus, 14 + 17 = 31.
Halichœres nigrescens, 10 + 15 = 25.
Hemitautoga hortulanus, 10 + 15 = 25.
Thalassoma pavo, 11 + 14 = 25.
Thalassoma lunare, 11 + 14 = 25.
Thalassoma dorsale, 11 + 14 = 25.
Julis julis, 11 + 14 = 25.
Julis atlantica, 11 + 14 = 25.
Coris aygula, 11 + 14 = 25.
Guntheria trimaculata, 10 + 15 = 25.
Pseudolabrus psittaculus, 9 + 16 = 25.
Pseudolabrus laticlavius, 9 + 16 = 25.
Gomphosus tricolor, 9 + 15 = 24.

Symphodus scina, 13 + 18 = 31.
Crenilabrus mediterraneus, 13 + 17 = 30.
Lachnolaimus maximus, 12 + 17 = 29.
Diastodon scrofa, 11 + 17 = 28.
Diastodon hirsutus, 11 + 17 = 28.
Anampses cœruleopunctatus, 11 + 15 = 26.
Duymæria aurigaria, 10 + 15 = 25.
Pseudolabrus celidotus, 10 + 13 = 23.
Xyrichthys macrolepidotus, 10 + 15 = 25.
Xyrichthys novacula, 9 + 16 = 25.
Cheilinus fasciatus, 10 + 13 = 23.
Decodon puellaris, 12 + 16 = 28.*
Clepticus parræ, 10 + 17 = 27.
Cheilinus trilobatus, 10 + 13 = 23.
Sparisoma cretense, 11 + 14 = 25.

As in most other large groups there has been shown considerable difference of opinion as to the characters which should be used in dividing the Labroids into genera. The tendency with all recent writers has been toward a rather minute subdivision. The numbers of vertebræ seem to us to yield characters of the highest importance. Other characters not to be neglected can be drawn from the size of the scales, the numbers of the dorsal spines, and the dentition. The degree of squamation of the head seems to us to have an importance lower than that attributed to it by Bleeker and Günther, but it may be used for generic subdivision.

a. Dorsal spines 8 or more, usually well distinguished from the soft rays; anal spines 2 to 6.

LABRINÆ:

b. Vertebræ and dorsal spines in increased number, vertebræ about 36 (15 + 18 to 20 + 21); dorsal spines 14 to 21; anal spines 3 to 6, all the spines pungent; anterior canines $\frac{4}{4}$; no posterior canines; lateral line complete; caudal fin never forked; species of northern waters, rarely tropical, most of them European.

c. Anal spines 4 to 6; dorsal spines 16 to 21; cheeks and opercles scaly; scales rather large; preopercle serrate.

d. Teeth small, in a single series; mouth small; dorsal fin nearly scaleless. CENTROLABRUS, 627.

cc. Anal spines 3. Teeth in more than one series.

e. Preopercle serrate; opercles scaly; scales moderate; interopercle naked; snout not especially produced. TAUTOGOLABRUS, 628.

ee. Preopercle entire; opercles naked; scales small; interopercle naked; snout blunt. TAUTOGA, 629.

bb. Vertebræ and dorsal spines not in greatly increased numbers; vertebræ 22 to 29; dorsal spines 8 to 13; anal spines 2 or 3; species of tropical or subtropical seas.

f. Vertebræ 27 to 29 (so far as known); dorsal spines usually 12 (11 to 14); sides of head more or less scaly; preopercle serrulate or entire.

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* "It will be evident that in those genera which are composed entirely or for the most part of tropical species, the vertebral column is composed of 24, or nearly 24, vertebræ, while those which are chiefly confined to the temperate seas of the Northern or Southern Hemisphere have that number increased in the abdominal and caudal portions." (Günther, Cat., IV, 65). This increase in the number of vertebræ in the northern forms has been used as a basis of the classification of the *Pleuronectidæ*, by Jordan and Goss, of the *Scorpænidæ*, by Jordan and Gilbert, and it will doubtless prove to have a high value in the subdivision of other families which have representatives in different zones. The cause of this peculiarity of fishes of cold waters is still obscure. Probably the reduction in number of segments is a result of the specialization of structure incident to the sharper competition of the tropical waters, where the outside conditions of life are very favorable for fishes, but the struggle of species against species is most severe. (Jordan.)

Harpinæ:

g. Anterior canines strong; lower pharyngeals large, with large, tubercular teeth; spinous dorsal not enveloped in scales, lower jaw naked; species mostly of large size and bright coloration, inhabiting semitropical seas.

h. Dorsal spines about 14, the 3 or 4 anterior falcate, produced in long streamers: body deep and compressed, the anterior profile steep; teeth uniserial; no posterior canine; cheeks and opercles scaly; bases of soft dorsal and anal scaly; soft parts of vertical fins produced; scales moderate (40). Lachnolaimus, 630.

hh. Dorsal spines 11 or 12 (rarely 13), none of them produced in filaments; cheeks and opercles scaly; body oblong; the back not greatly elevated.

i. Soft dorsal and anal fins each with a scaly sheath at base; scales large (about 32); posterior canine present.

j. Soft dorsal and anal elevated, produced behind.
Harpe, 631.

ii. Soft dorsal and anal without sheath of scales; preopercle serrulate (at least in young); soft dorsal and anal more or less falcate.

k. Scales large, about 30; lower limb of preopercle scaly; posterior canine present; anterior canines $\frac{4}{4}$.
Decodon, 632.

kk. Scales moderate or small, 45 to 60; both limbs of preopercle naked; adult male with a fleshy hump on the forehead; caudal subtruncate, with the angles more or less produced.

l. Posterior canines present; anterior canines $\frac{4}{4}$; dorsal spines 12.

m. Scales small, about 60 in lateral line.
Pimelometopon, 633.

Clepticinæ:

gg. Anterior teeth small, bluntish, not canine-like; no posterior canine; mouth very small, terminal; snout short and blunt; dorsal and anal enveloped in scales, except produced tips of both fins; caudal deeply forked; dorsal spines almost hidden by series of scales; head everywhere closely scaled, except on lips and snout; scales of body large; preopercle serrulate; gill rakers slender, short; pectoral falcate; lower pharyngeals very small, Y-shaped, their teeth small, very blunt and coalescent; vertebræ $10 + 17 = 27$; dorsal spines 12.
Clepticus, 634.

ff. Vertebræ 23 to 26; dorsal spines 8 or 9; anterior canines strong, 2 to 4 on each side in each jaw; head mostly naked; preopercle entire. Species of the Tropics, mostly of small size and bright coloration.

Julidinæ:

n. Lateral line complete and continuous.

o. Snout not tubiform; preopercle entire; teeth uniserial; none of the teeth chisel-shaped.

p. Cheeks and opercles naked.

q. Scales large, 25 to 30 in the lateral line; anal spines 2 or 3.

r. Dorsal spines 9; dorsal enlarged, without scaly sheath; scales of breast not enlarged.

s. Anterior canines all normal in position; lower pharyngeals T-shaped, with numerous teeth; anal spines 3.

t. Posterior canine well developed on both sides; dorsal spines pungent; anterior canines $\frac{2}{4}$.
Iridio, 635.

tt. Posterior canines wanting or reduced to a slight rudiment.

u. Anterior canines $\frac{4}{4}$; dorsal spines slender but pungent. EMMEEKIA, 636.

uu. Anterior canines $\frac{2}{4}$.

v. Dorsal spines slender and very flexible; body very slender. OXYJULIS, 637.

vv. Dorsal spines pungent. JULIDIO, 638.

uuu. Anterior canines $\frac{2}{2}$; dorsal spines pungent. PSEUDOJULIS, 639.

rr. Dorsal spines 8; no posterior canines; anterior canines $\frac{2}{2}$, normal in position; a low sheath of scales at base of dorsal; dorsal spines pungent; anal spines 3, never 2. CHLORICHTHYS, 640.

XYRICHTHYINÆ:

nn. Lateral line interrupted posteriorly, beginning again on the level of the axis of the body, on the caudal peduncle; scales large, 20 to 30 in the lateral line; dorsal spines 9; anal spines 3; anterior canines $\frac{2}{2}$.

w. Posterior canine present; snout slender, the anterior profile not convex; cheeks and opercles scaly; dorsal spines pungent, the three anterior longer and with filamentous appendages; dorsal and anal with a scaly sheath; scales very large. DORATONOTUS, 641.

ww. Posterior canine none; anterior profile more or less convex; head naked, except usually a few scales below the eye; body more or less strongly compressed; ventrals thoracic, inserted below the pectorals.

x. Scales very large, about 20 in the lateral line, which is placed on the first row of large scales below the dorsal sheath; anterior dorsal spines not detached; head not trenchant above. XYRULA, 642.

xx. Scales large, about 26 in the lateral line, which is placed on the second row of large scales below the dorsal sheath.

y. First two dorsal spines joined by membrane to the others, and inserted nearly above base of pectorals.

z. Upper anterior profile of head not trenchant, the curve of head not parabolic; the cheeks not very deep. NOVACULICHTHYS, 643.

zz. Upper anterior profile of head sharply trenchant, its curve parabolic; cheeks very deep, the eye near upper profile. XYRICHTHYS, 644.

yy. First two dorsal spines detached from the others and inserted on or close behind the occiput. INIISTIUS, 645.

627. CENTROLABRUS, Günther.

(ROCK COOKS.)

Centrolabrus, GÜNTHER, Cat. Fish. Brit. Mus., IV, 92, 1862 (*exoletus*).

Body oblong, covered with moderate-sized scales; cheeks and opercles scaly; preopercle serrate; teeth in a single series; mouth small; dorsal fin nearly scaleless; anal spines 4 to 6; dorsal spines 16 to 21. This genus contains 2 or 3 species, found on the coasts of Europe, one of them ranging farther to the north than any other Labroid fish. (*κέντρον*, spine; *Labrus*, an allied genus).

1983. CENTROLABRUS EXOLETUS (Linnæus).

(Rock Cook.)

Head $4\frac{1}{2}$; depth $3\frac{1}{2}$. D. XVII to XX, 6; A. V, 7 or 8; scales 3-33-10. Body rather robust; the snout of moderate length, about $3\frac{1}{3}$ in head; mouth very small, its cleft reaching barely halfway to front of eye; eye rather large; dorsal spines low, the soft rays somewhat higher, but lower than the anal; caudal rounded. Three rows of scales on cheek. Color rich brown, the sides shaded with yellow; narrow yellow lines along the rows of scales; a dark spot on eye above; 2 blue bands from eye to angle of mouth, and 2 more across preopercle; no black spot behind eye; a dull bluish mark on opercle; fins yellowish silvery; a line of dark marks along spinous dorsal; caudal with a black base and a white outer margin. (Day.) Coasts of northern Europe, south to Cornwall; abundant in Norway; said by Fabricius to range occasionally westward to Greenland; the most arctic of all species of *Labridæ*. (*exoletus*, antiquated; said to be in allusion to the anomalous number of 5 spines in the anal.)

Labrus exoletus, Linnæus, Syst. Nat., Ed. x, 287, 1758, Atlantic Ocean; Fabricius, Fauna Grönlandica, 166, 1780.

Labrus pentacanthus, Lacépède, Hist. Nat. Poiss., iii, 503, 1803; after Linnæus.

Crenilabrus microstoma (Couch) Thompson, Proc. Zool. Soc. London 1837, 55, Cornwall.

Acantholabrus exoletus, Cuvier & Valenciennes, Hist. Nat. Poiss., xiii, 247, 1839; Collett, Norges Fiske, 94.

Centrolabrus exoletus, Günther, Cat., iv, 92; Day, Fish. Gt. Britain, 267; Jordan, Review Labroid Fishes, 605, 1890.

628. TAUTOGOLABRUS, Günther.

(Cunners.)

Tautogolabrus, Günther, Cat. Fish. Brit. Mus., iv, 89, 1862 (*burgall—adspersus*).

Body oblong, not elevated, comparatively slender and compressed; head moderate, more or less pointed, but the jaws not notably produced; teeth in the jaws in several series, the outermost very strong; the teeth unequal, conical and pointed; no posterior canines. Cheeks with small scales; opercles with large ones; interopercles naked; preopercle with the vertical limb finely serrated. Branchiostegals 5. Gill membranes considerably united, free from the isthmus; gill rakers short. Scales moderate, 35 to 50 in the lateral line; lateral line continuous, abruptly bent opposite posterior part of second dorsal; dorsal long and low, the spinous portion much longer than the soft, of 18 or 19 low, subequal, rather strong spines; soft dorsal slightly elevated; anal fin similar to soft dorsal, with 3 strong graduated spines; caudal truncate; pectorals short, the ventrals inserted behind their axils. Species 2, both American—*Tautogolabrus brandaonis* from Brazil, and the following. This genus is very close to the European genus *Ctenolabrus*, differing in the less perfect squamation of the head and in the greater number of dorsal spines and vertebræ. (*Tautoga: Labrus*, related genera, from the Latin *labrum*, lip).

1984. TAUTOGOLABRUS ADSPERSUS (Walbaum).

(CUNNER; CHOGSET; BLUE PERCH; BERGALL; BERG-GYLT.)

Head 3¼ to 3½; depth 3 to 3⅓. D. XVIII, 10; A. III, 9; scales 6–46–12; vertebræ 17 + 19 = 36; eye 4½ in head; pectoral 2; highest dorsal spine 2⅔; highest dorsal rays 2; third anal spine 2½. Body rather robust; head moderately pointed, much less obtuse than in *Tautoga;* snout moderate, longer than eye; mouth moderate, maxillary about reaching front of eye; 5 canines in front of upper jaw, about 4 in lower, the teeth on sides of jaw enlarging anteriorly; bands of small concave teeth behind canines; gill rakers very short, about 6+11; scales rather small; top of head, preorbital, maxillary, lower jaw, interopercle, and posterior edge of preopercle and opercle naked; preopercle with about 5 rows of small scales; opercle with 4 or 5 rows of larger ones; fins naked. Color livid blue, shaded with brownish above and with more or less of a brassy luster on sides; head and back sometimes spotted with brassy; young with darker blotches and markings, and often a black blotch near middle of dorsal fin. Extremely variable in shades of coloration. This little fish is exceedingly abundant about rocks and wharves near shore in the regions where it is found. It reaches a length of about 10 inches, being too small to have much value as food, although its flesh is of excellent flavor. These fishes, although performing a useful duty as scavengers, are a pest to the fishermen from their habit of nibbling the bait from their hooks. Atlantic coasts of North America, from Labrador to Sandy Hook. (*adspersus*, besprinkled.)

Burgall, SCHÖPF, Gesellsch. Naturf. Freunde, VIII, 155, 1788, New York.
Labrus adspersus, WALBAUM, Artedi Piscium, 254, 1792; after *Burgall* of SCHÖPF.
Tautoga niger, MITCHILL, Report, in part, on the Fishes of New York, 23, 1814, New York.
Tautoga cærulea, MITCHILL, Report, in part, Fishes of New York, 24, 1814, New York.
Labrus chogset, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 402, pl. 3, f. 2, New York.
Labrus chogset fulva, MITCHILL, *l. c.*, 403, 1815, New York.
Ctenlabrus uninotatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 239, 1839, New York; young; DE KAY, New York Fauna: Fishes, 174, pl. 29, f. 90, 1842; GÜNTHER, Cat., IV, 90, 1862.
Ctenolabrus burgall, GÜNTHER, Cat., IV, 90, 1862, Canada.
Ctenolabrus chogset, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 237, 1839.
Ctenolabrus cæruleus, DE KAY, New York Fauna: Fishes, 172, pl. 29, f. 93, 1842.
Tautogolabrus adspersus, BEAN, Proc. U. S. Nat. Mus. 1880. 87.
Ctenolabrus adspersus, STEARNS, Proc. U. S. Nat. Mus. 1883. 123; JORDAN & GILBERT, Synopsis, 599, 1883; GOODE, Nat. Hist. Aquat. Anim., 273, 1884; JORDAN, Review Labroid Fishes, 623, 1890.

629. TAUTOGA, Mitchill.

(TAUTOGS.)

Hiatula, LACÉPÈDE, Hist. Nat. Poiss., II, 522, 1800 (*hiatula*); name preoccupied by *Hiatula*, Modeer, 1793, a genus of Mollusks.
Tautoga, MITCHILL, Report, in part, Fish. New York, 23, 1814 (*tautoga*).

Body long, not elevated nor greatly compressed. Head large, nearly as deep as long, with a convex profile. Mouth rather small. Teeth very strong, conical, in 2 series; the outer somewhat incisor-like; the 2 anterior teeth in each jaw strong; the posterior teeth small, without canines. Eye small, high up. Cheeks with small scales; interopercle naked; opercles naked, except above; scales on body rather small, in about 60 transverse series, those on ventral region reduced in size; lateral line continuous, abruptly decurved opposite the end of the soft dorsal. Dorsal fin long, low, continuous, the spinous part much the longer, with about 16 low, strong, subequal spines, each with a small cutaneous appendage at tip; soft dorsal higher than spinous; anal similar to soft dorsal, with 3 stout, graduated spines; pectorals broad and rather short; caudal short, truncate, with rounded angles; the soft parts of the vertical fins with the membranes somewhat scaly; ventrals conspicuously behind pectorals. Branchiostegals 5. Gill rakers very short and feeble; gill membranes somewhat connected, free from the isthmus. Vertebræ $16+18=34$. This genus contains a single species, a large dull-colored Labroid, abundant on the Atlantic coast of the United States. (A latinization of the vernacular name "Tautog," which is of Indian origin.)

1985. **TAUTOGA ONITIS** (Linnæus).

(TAUTOG; BLACK-FISH; OYSTER-FISH.)

Head 3¼ to 3½; depth 2⅔ to 3. D. XVI, 10; A. III, 8; eye 5½ in head; snout 3; pectoral 1⅔; ventral 2; highest dorsal spine 3; highest dorsal ray 1⅘; third anal spine 3; highest anal ray 1⅘; scales 14–60–25. Body somewhat deep and compressed; profile moderately steep, well rounded from snout to dorsal; maxillary reaching the vertical from anterior nostril; jaws about equal, with 2 or 3 large canines and smaller ones on the side, which gradually diminish in size backward; gill rakers very short and blunt, about $3+6$; a patch of small scales behind eye extending downward to middle of cheek, where there are 5 or 6 series, head and opercles otherwise naked; pectorals broad and rounded, not quite reaching tips of ventrals; soft dorsal higher than spinous; caudal truncate or slightly rounded. Color blackish or greenish; the young usually with about 3 pairs of dark bars connected by reticulations; adult often nearly plain blackish; chin white; eye greenish. The tautog is one of the most valuable food-fishes of the Atlantic coast. It is generally abundant within its range, and its flesh is of superior quality. The largest specimen known, according to Dr. Goode, had a length of about 3 feet. Atlantic coasts of the United States, from New Brunswick to Charleston, South Carolina, about rocks and kelp in shallow water; New Brunswick (Goode); Casco Bay and Freeport, Maine (Kendall). (*ὀνῖτις*, a kind of plant; application unexplained.)

Labrus onitis, LINNÆUS, Syst. Nat., Ed. X, 286, 1758; Ed. XII, 478, 1766: type locality not given.

Labrus hiatula, LINNÆUS, Syst. Nat., Ed. XII, 475, 1766, Carolina (Coll. Dr. Garden); JORDAN, Proc. U. S. Nat. Mus. 1885, 396; note on LINNÆUS' type.

Labrus carolinus, BONNATERRE, Tableau Encycloped. et Méthod., Ichthyologie, 113, 1788, Carolina; after LINNÆUS.

Labrus blackfish, SCHÖPF, Schrift der Gesellsch. Natur. Freunde, VIII, 156, 1788, New York.

Labrus subfuscus, WALBAUM, Artedi Piscium, 254, 1792; after SCHÖPF.

Labrus tessellatus, BLOCH, Ichthyologia, pl. 291, 1792, Norway.

Hiatula gardeniana, LACÉPÈDE, Hist. Nat. Poiss., II, 522, 1800, Carolina; after *Labrus hiatula*, LINNÆUS.

Labrus americanus, BLOCH & SCHNEIDER, Syst. Ichth., 261, 1801; after SCHÖPF.

Labrus tautoga, MITCHILL, Trans. Am. Phil. Soc. 1815, 399, Long Island; Rhode Island; Cape Cod; Sandy Hook.

Labrus tautoga fusca, MITCHILL, Trans. Am. Phil. Soc. 1815, 402, New York.

Labrus tautoga rubens, MITCHILL, *l. c.*, 1815, 402, New York.

Labrus tautoga alia, MITCHILL, *l. c.*, 1815, 402, New York.

Tautoga tessellata, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 315, 1839; after BLOCH.

Tautoga americana, DE KAY, New York Fauna: Fishes, 175, pl. 14, fig. 39, 1842; STORER, Hist. Fish. Mass., 276, 1867.

Tautoga onitis, GÜNTHER, Cat., IV, 88, 1862; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 374; BEAN, Proc. U. S. Nat. Mus. 1880, 87; JORDAN & GILBERT, Synopsis, 600, 1883; GOODE, Nat. Hist. Aquat. Anim., 268, 1884.

Hiatula onitis, JORDAN & GILBERT, Synopsis, 936, 1883; JORDAN, Proc. U. S. Nat. Mus. 1886, 28; JORDAN, Review Labroid Fishes, 625, 1890.

Hiatula hiatula, GOODE & BEAN, Proc. U. S. Nat. Mus. 1885, 201; note on type of *Labrus hiatula*.

630. LACHNOLAIMUS, Cuvier & Valenciennes.

(CAPITAINES.)

Lachnolaimus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 274, 1839 (*aigula* = *maximus*).

Lachnolæmus, GÜNTHER; corrected spelling.

Body strongly compressed, the back sharp and elevated, the profile long and steep. Snout sharp; mouth low, horizontal, the jaws narrow; premaxillary slipping under the membranaceous edge of the very broad preorbital, which is twice the depth of the eye. Teeth in front prominent, canine-like, in a single series; no posterior canines. Cheeks and opercles with imbricate scales; scales of moderate size, thin, adherent; lateral line complete. Dorsal with 14 spines, the first 3 strong, falcate, produced in long streamers in the adult, the membranes between these spines very low, the filamentous tips longer than the head; other spines all low, gradually shorter to the eleventh; second dorsal and anal much produced; caudal lobes falcate; third anal spine strong; pectorals and ventrals short. This genus contains a single species, a large, showy fish of tropical America, remarkable for the long streamer-like filaments on the dorsal spines. (*λάχνη* down, velvet; *λαιμός*, throat, the pharyngeal bones being only partly provided with teeth, and the rest of their surface with a velvety membrane.)

1986. LACHNOLAIMUS MAXIMUS (Walbaum).

(HOGFISH; CAPITAINE; PERRO PERRO.)

Head 3; depth 2⅓. D. XIV, 11 or 12; A. III, 11; eye 4 in head; snout 2½; filamentous dorsal spines ½ longer than head; pectoral 1½ in head, equal to ventrals; highest dorsal ray 1⅓; third anal spine 2⅓; longest anal rays 1⅐; scales 8–39–13.

Body deep, strongly compressed, the back much elevated, the profile long and steep, slightly concave before eye; snout sharp; maxillary reaching to anterior origin of pupil; canine teeth prominent; 4 sharp canines in front of upper jaw, 2 in the sides of lower jaw, 2 small conical teeth between them; filamentous dorsal spine reaching to last rays of soft dorsal; pectoral not wide, its upper rays the longest, its posterior end sharp above, not reaching to end of ventrals, which reach about to vent; soft dorsal and anal similar, pointed behind; caudal lunate. Top of head, preorbital, maxillary, and lower jaw naked; cheek with about 6 rows of small scales, opercle with about 5 rows; small scales on interopercles. Color reddish gray, varying to brick red; some of the scales olive green at base; cheeks greenish, head mottled; a large round blue black blotch at base of last rays of soft dorsal; caudal grayish, with 3 rows of dull olive spots; anal similarly colored; an undulate blue line below eye; adult male with vertical fins blackish at base, the black forming a crescent on the caudal; frontal region from snout to occiput abruptly blackish. The variations in the ground color are considerable, older fishes and fishes taken in deep water being much redder than small fishes or fishes taken from grassy bottoms. One of the latter, 1 foot in length, was gray, violaceous above, each scale olive green at base; lower parts tinged with creamy orange; head more purplish, mottled with olive; cheeks greenish; an undulate blue line below eye, below which are purplish reticulations; long spines of the dorsal fin greenish at base, orange at tip; soft dorsal similar, a large black blotch at its base; caudal grayish, with 3 rows of dull olive spots; anal similarly colored; pectoral light orange; ventrals blackish at tip, reddish at base. Deep-water fishes are brick red or orange red, the degrees of redness being very variable, the markings constant. The adult male has further, the vertical fins all blackish at base, the black forming a crescent on the caudal; frontal region from snout to occiput abruptly blackish; lower jaw light yellow. The male fish has the cleft of the mouth very much wider than the female. These large-mouthed hogfish are thought by many fishermen to belong to a different species. One specimen had 4 elongate spines in the dorsal. Vertebræ $12 + 17 = 29$. Length 2 feet. West Indies; abundant north to Key West and Bermuda, about reefs and rocks. This large and showy species is generally common in the West Indies. It reaches sometimes a weight of 12 to 15 pounds, and is generally esteemed as a food-fish. It changes much in the course of its growth, and has thus received several specific names. (*maximus*, largest.)

Suillus (The Great Hogfish), Catesby, Nat. Hist. Carolina, pl. 15, 1750, Bahamas.

Labrus maximus, Walbaum, Artedi Piscium, 261, 1792; after Catesby.

Lachnolaimus suillus, Cuvier, Regne Animal, Ed. II, Vol. 2, 257, 1829; after Catesby; Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 283, 1839; Poey, Enumeratio, 105, 1875; Bean & Dresel, Proc. U. S. Nat. Mus. 1884, 153.

Lachnolaimus aigula, Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 277, 1839, St. Bartholomew.

Lachnolaimus dux, Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 285, 1839, Martinique.

Lachnolaimus caninus, Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 288, 1839, St. Thomas; San Domingo; Poey, Synopsis, 330, 1868, Havana.

Lachnolaimus psittacus, Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 291, 1839, Porto Rico.

Lachnolaimus falcatus, Günther, Cat., IV, 87, 1862; after *Labrus falcatus* L., but the Linnæan *falcatus* is a *Trachinotus*; Goode, Bull. U. S. Nat. Mus., V, 36, 1876; Jordan & Gilbert, Synopsis, 601, 1883; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1884, 134; Goode, Nat. Hist. Aquat. Anim., 275, 1884; Stearns, Nat. Hist. Aquat. Anim., 275, 1884.

Lachnolæmus maximus, Jordan, Proc. U. S. Nat. Mus. 1884, 546; Jordan, Proc. U. S. Nat. Mus. 1886, 45; Jordan, Review Labroid Fishes, 626, 1890.

631. HARPE, Lacépède.

(LADY-FISHES.)

Bodianus, BLOCH. Ichthyol., IV, 33, 1790 (*bodianus; guttatus*, etc.), in part; restricted by CUVIER to *Bodianus guttatus*, one of the *Serranidæ*.

Harpe, LACÉPÈDE, Hist. Nat. Poiss., IV, 426, 1802 (*cæruleo-aureus=rufus*).

Cossyphus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 102, 1839 (*bodianus=rufus*); name preoccupied by *Cossyphus*, FABRICIUS, 1792, a genus of Coleoptera, and by *Cossyphus*, DUMÉRIL. 1802, a genus of birds.

Crenilabrus, SWAINSON, Nat. Hist. Class'n Fishes, II, 1839 (*verres=rufus*); not *Crenilabrus* of CUVIER.

Harpe, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 222 (*bodianus=rufus*).

Bodianus, POEY, Repertorio. II, 331, 1867 (*bodianus*).

Body robust, moderately compressed, covered with firm scales of varying size, about 33 in the course of the lateral line, which is continuous. Head rather pointed in the young, becoming very deep and convex in the adult from the development of adipose tissue on the top of the head. Opercle, subopercle, interopercle, and cheeks scaly, preopercle naked; preopercle minutely serrulate, usually becoming entire with age. Mouth rather large. Jaws each with 4 strong, conical, somewhat compressed canines in front, the lateral teeth similar, but much smaller, coalescent at base with each other, and with small granular teeth, so that the surface of the jaws is bony; upper jaw with strong posterior canines, directed forward. Dorsal fin with about 12 low spines, each portion with a scaly sheath at base, the rays naked; anal with 3 spines, the spines rather strong; lobes of soft dorsal, anal, and caudal more or less produced in the adult;* ventrals inserted directly below pectorals. Gill membranes slightly connected. Vertebræ $11 + 17 = 28$. Coarse, brightly colored fishes, inhabiting tropical seas. (ἅρπη, scythe; in allusion to the falcate fins.)

a. Color in life not red; male blue, with a yellow patch behind the pectoral fin, which has a large dark spot on its extremity; head, tail, and fins bright red, their tips black and yellow; forehead very gibbous in the adult. Female brownish yellow; a dark band commences behind the snout and is divided into 2 behind the eye, the upper portion running along the back and nearly joining its fellow from the other side on the back of the free portion of the tail, while the lower crosses the angle of the operculum and is continued on to the middle of the tail, terminating near the caudal and alternating with 2 spots behind the base of the caudal fin; fins yellowish or orange. Forehead scarcely gibbous in the adult. DIPLOTÆNIA, 1987.

aa. Color chiefly red, without dark bands or stripes.

  b. Pectorals immaculate.

    c. Body without dark cross band, or conspicuous pale blotch.

      d. General color violet red above and anteriorly, yellow or orange behind and below; lower part of sides and posterior part of body yellowish orange; upper part of head and body (as far back as a line adjoining base of pectoral and soft dorsal) violet red; middle of caudal, bases of pectorals and ventrals, and most of anal violaceous; fins a little less produced than in *H. diplotænia*. RUFA, 1988.

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* This character distinguishes *Harpe* from *Diastodon*, Bowdich, (Exc. Madeira, 1825, 238), =*Lepidoplois* Gill, an Old World genus with the vertical fins low.

dd. General color vermilion, with two large, irregular, black blotches on the back and dorsal fin, the anterior on the first 6 dorsal spines, the posterior extending over the whole soft dorsal and over a portion of the back of the tail; snout pointed, with the upper profile slightly concave; head longer than high; caudal emarginate.
ECLANCHERI, 1989.

bb. Pectorals with a large dark-blue spot towards the tip; color carmine red; fins edged with darker; base of pectorals whitish; side of body with a pale rose-colored band; dorsal fin low; ventrals reaching vent; snout sharp.
PULCHELLA, 1990.

1987. HARPE DIPLOTÆNIA, Gill.

Head about 3; depth 3 to 3½ (including scaly dorsal sheath). D. XII, 11; A. III, 13; scales 5–33–12.

Male: Forehead very gibbous in the adult; a large, rounded, fleshy pad on the forehead of the adult male, overhanging the snout slightly, and about 3 times the width of the eye in height; preopercle entire, or very slightly crenulated; eye a little less than 6 in head, which is about 3 to 3⅓ in length; lower lip extending downwards in a loose flap on each side to below the chin in the adult, which has a fleshy mass below; all the fins (except the pectorals) elongate in the adult, the dorsal nearly reaching, and the anal extending beyond, the median caudal rays; external caudal rays twice, or more, as long as the median; in large specimens the ventrals extend to posterior end of base of anal. In life, blue, with a yellow patch behind the pectoral fin, which has a large dark spot on its extremity; head, tail, and fins bright red, their tips black and yellow.

Female: Forehead scarcely gibbous in the adult; preopercle entire or slightly crenulated; eye 6 in head, which is about equal to depth; vertical fins elongate in the adult, the dorsal extending nearly to, and the anal beyond, the median caudal rays, which are ½ as long as the external rays. Color brownish yellow; a dark band commences behind the snout and is divided into 2 behind the eye, the upper portion running along the back and nearly joining its fellow from the other side on the back of the free portion of the tail, while the lower crosses the angle of the operculum and is continued on to the middle of the tail, terminating near the caudal and alternating with 2 spots behind the base of the caudal fin; fins yellowish or orange.

Pacific coast of tropical America, about rocky islands; not rare, but not easily taken; known from Cape San Lucas, Panama, the Revillagigedo Islands, and the Venados at Mazatlan. (*διπλόος*, double; *ταινία*, band, from the coloration of the female.)

Harpe diplotænia, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 140, female, Cape San Lucas, (Coll. Xantus); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 367 (note on *H. diplotænia* Gill); JORDAN, Review Labroid Fishes, 29, 1890.

Harpe pectoralis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 141, male, Cape San Lucas (Coll. Xantus); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 367 (note on type).

Cossyphus pectoralis, GÜNTHER, Cat., iv, 110, 1862.

Cossyphus diplotænia, GÜNTHER, Cat., iv, 110, 1862.

Bodianus pectoralis, JORDAN, Proc. U. S. Nat. Mus. 1885, 384.

Bodianus diplotænia, JORDAN, Proc. U. S. Nat. Mus. 1885, 384.

1988. HARPE RUFA (Linnæus).

(LADY-FISH; SPANISH LADY-FISH; SPANISH HOGFISH; PUDIANO; PERRO COLORADO.)

Head 3½; depth nearly 3. D. XII, 9; A. III, 11 or 12; scales 5–32–13; snout 3⅓ in head. Head longer than high; snout pointed; preopercle denticulate; fins a little less produced than in *H. diplotænia*. General color, violet red above and anteriorly, yellow or orange behind and below; lower part of sides and posterior part of body yellowish orange; upper part of head and body (as far back as a line joining base of pectoral and soft dorsal) violet red; middle of caudal, bases of pectoral and ventrals, and most of anal, violaceous. Length 2 feet. A handsomely colored fish, generally common in the West Indies, about islands and reefs; north to Key West, Bermuda and St. Paul Rocks; south to Rio Janeiro; our specimens are from Havana. (*rufus*, yellowish red.)

Pudiano vermelho, Marcgrave, Hist. Bras., 145, 146, 1648, Brazil; on a drawing by Prince Maurice of Nassau.

Turdus flavus (the Hogfish), Catesby, Nat. Hist. Carolina, II, pl. 2, fig. 1. 1743, Bahamas.

Labrus rufus, Linnæus. Syst. Nat., Ed. x, 284. 1758, and Ed. xii. 475. 1766; after Catesby; Goode & Bean, Proc. U. S. Nat. Mus. 1885. 200 (note on Linnæan specimen.)

Perro colorado, Parra, Descr. Dif. Piez. Hist. Nat. Cuba, 3. lam. 3, fig. 1, 1787, Havana.

Bodianus bodianus, Bloch, Ichth., VII, 24, pl. 223, 1790, Brazil; from a drawing by Prince Maurice, the same used by Marcgrave.

Lutjanus verres, Bloch. Ichthyol., pl. 255. 1791, locality uncertain.

Sparus falcatus. Bloch, Ichthyol., pl. 258, 1791; after a drawing by Plumier, made at Martinique.

Labrus semiruber, Lacépède, *l. c.*, III, 428, 1803, Rio Janeiro; from notes by Commerson.

Bodianus blochii, Lacépède, Hist. Nat. Poiss. IV, 279, 290. 1803; after *Bodianus bodianus*, Bloch.

Harpe cœruleo-aureus, Lacépède, *l. c.*, 426, 427, pl. 8, fig. 2, 1803, Martinique; from the drawing of Plumier, used by Bloch.

Cossyphus bodianus. Cuvier & Valenciennes, Hist. Nat. Poiss., XIII, 103, 1839.

Cossyphus verres, Castelnau, Anim. Nouv. ou Rares Amérique du Sud, Ichth., 27, 1855.

Cossyphus rufus. Günther. Cat., IV, 108, 1862; Günther, Shore-Fishes, Challenger, 14, 1880.

Harpe rufa, Gill, Proc. Ac. Nat. Sci. Phila. 1863, 222; Goode, Fishes Bermudas, 37, 1876; Jordan & Gilbert, Synopsis, 601, 1883; Jordan, Review Labroid Fishes, 629, 1890.

Bodianus rufus, Poey, Repertorio, II, 331, 1867; Jordan, Proc. U. S. Nat. Mus. 1884, 148; Jordan, Proc. U. S. Nat. Mus. 1886, 45.

1989. HARPE ECLANCHERI (Valenciennes).

Head 3½; depth 3. D. XII, 10; A. III, 12; scales 32. Snout pointed with the upper profile slightly concave; head longer than high; dorsal and anal fins produced; caudal emarginate. General color vermilion, with 2 large, irregular, black blotches on the back and dorsal fin, the anterior on the first 6 dorsal spines, the posterior extending over the whole soft dorsal and over a portion of the back of the tail. (Valenciennes). This species is known from Valenciennes's description and figure only. It much resembles *Harpe rufa*, apparently differing only in color. Galapagos Islands. (Named for M. Éclancher.)

Cossyphus eclancheri, Valenciennes, Voy. Vénus, Zool., 340. Poiss., pl. 8, fig. 2, plates, 1846; text, 1855, Galapagos Islands; Günther. Cat., IV. 108, 1862.

Harpe eclancheri, Jordan, Review Labroid Fishes, 630, 1890.

1990. HARPE PULCHELLA (Poey).

Head 4¾; depth 4¾. D. XII, 9; A. III, 12. Dorsal fin low; fins somewhat produced; ventrals reaching vent; snout sharp; pectorals with a large dark-blue spot toward the tip; color carmine red, fins edged with darker; base of pectorals whitish; side of body with a paler rose-colored band. (Poey.) Cuba; known to us solely through Poey's descriptions. (*pulchellus*, pretty.)

Cossyphus pulchellus, POEY, Memorias, II, 208, 1860, Havana; GÜNTHER, Cat., IV, 108, 1862.
Bodianus pulchellus, POEY, Synopsis, 232, 459, 1868.
Harpe pulchella, JORDAN, Review Labroid Fishes, 630, 1890.

632. DECODON, Günther.

Decodon, GÜNTHER, Cat. Fish. Brit. Mus., IV, 101, 1862 (*puellaris*).

Body moderately compressed, oblong, covered with large scales; head oblong; cheeks, opercles, and lower limb of preopercle scaly, the posterior limb being naked; base of dorsal and anal not scaly; lateral line continuous. Teeth essentially as in *Harpe*, those of the jaw in a single series; 4 canines in the front of each jaw; a posterior canine on each premaxillary. Dorsal with 11 spines; anal with 3. Vertebræ 12+16=28. Intermediate between *Bodianus* and *Trochocopus*, having the large scales of the former and the naked fins of the latter. A single species, a small fish belonging to the West Indian fauna. It is closely related to *Harpe*. (*δέκα*, ten; *ὀδούς*, tooth; there being 10 canines.)

1991. DECODON PUELLARIS (Poey).

Head 3⅓; depth 4. D. XI, 10; A. III, 10; scales 2½–30–8; vertebræ 12+16=28. Body moderately compressed, oblong; head oblong; cheeks, opercles, and lower limb of preopercle scaly, the posterior limb being naked; teeth uniserial; 4 canines in the front of each jaw; maxillary reaching a little beyond eye, which is as wide as the interorbital space, shorter than snout; edge of preopercle minutely denticulated; caudal emarginate; ventrals not reaching vent; color, according to Poey, rose red, with 3 large red blotches; head with several pearl-colored streaks (yellow in life); a transverse one between the nostrils; 2 oblique ones running from orbit toward subopercle, and a broad one from angle of mouth to angle of preopercle; some yellow spots on sides of head; each scale on sides with a yellow spot on its edge; fins mostly red, the soft dorsal and anal with 4 rounded yellow spots; several spots on spinous dorsal and caudal. Length 6 inches. West Indies, north to Florida; known from Cuba, Pensacola Snapper Banks, and Barbados. This small species is not uncommon at Havana. The 2 specimens examined by us were taken from the stomachs of groupers in deep water on the Snapper Banks south of Pensacola. (*puellaris*, pretty, from *puella*, girl.)

Cossyphus puellaris, POEY, Memorias, II, 210, 1860, Havana.
Decodon puellaris, GÜNTHER, Cat., IV, 101, 1862; POEY, Synopsis, 332, 1868; JORDAN, Proc. U. S. Nat. Mus. 1884, 545; JORDAN, Review Labroid Fishes, 632, 1890.

633. PIMELOMETOPON, Gill.

(FAT-HEADS.)

Pimelometopon, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 58 (*pulcher*).

Body robust, covered with small scales, about 60 in lateral line; both limbs of the preopercle naked; caudal subtruncate, with the angles more or less produced. Posterior canines present; anterior canines $\frac{4}{4}$; dorsal spines 12; adult male with the forehead greatly elevated, covered with a thick pad of fat. This genus is close to *Harpe*, differing chiefly in the naked dorsal and smaller scales. The small size of its scales distinguishes it from *Trochocopus*, and the presence of posterior canines from *Semicossyphus*. Robust species, of large size and bright colors. (*πιμελή*, fat; *μέτωπον*, forehead.)

a. Color (males), head, dorsal, anal, and caudal fins, also the posterior part of the body as far forward as the vent, purplish black; lower jaw white; the rest of the body varying in tint from clear crimson to blackish, with coppery or purplish luster; females dusky rose-colored, with black areas ill defined or obsolete; preopercle serrulate in young, becoming entire. PULCHER, 1992.

aa. Color red; a large yellow blotch above the pectoral, and a black one anteriorly on the spinous dorsal; preopercle entire. DARWINII, 1993.

1992. PIMELOMETOPON PULCHER (Ayres).

(CALIFORNIA REDFISH; FAT-HEAD.)

Head 3; depth 3. D. XII, 10; A. III, 12; eye 5 in head; snout $2\frac{1}{2}$; scales 60, 11 above lateral line; vertebræ 11+17=28. Body somewhat deep and compressed; forehead in the adult with a very prominent fatty hump; snout rather blunt; caudal truncate, its lobes being produced and pointed in the adult; gill rakers short and thickish; scales on breast small; cheeks, opercles, and interopercles with scales; fins naked; preopercle serrulate in young. Color (males), head, dorsal, anal, and caudal fins, also the posterior part of the body as far forward as vent, purplish black, lower jaw white; the rest of the body varying in tint from clear crimson to blackish, with coppery or purplish luster; females dusky rose-colored, with the black areas ill defined or obsolete. Length 3 feet. Coast of southern California, from Point Concepcion to Ascension Island in Lower California. This large and handsome fish is very common on the coast of southern California, and is taken in enormous numbers in the kelp off the shore. It is taken chiefly by the Chinese, with hook and line. It is salted and dried by them. It reaches a weight of 12 to 15 pounds. The male is quite different in color from the female, and the old individuals, as usual with large Labroids, have the forehead surmounted by a mass of fat. The specimens described are from San Diego. (*pulcher*, beautiful.)

Labrus pulcher, AYRES, Proc. Cal. Ac. Sci., I, 1854, 3, San Diego.

Semicossyphus pulcher, GÜNTHER, Cat., IV, 99, 1862.

Pimelometopon pulcher, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 59; JORDAN, Proc. U. S. Nat. Mus. 1880, 29 and 455.

Harpe pulchra, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 278; JORDAN & GILBERT, Synopsis, 602, 1883.

Trochocopus pulcher, ROSA SMITH, Proc. U. S. Nat. Mus. 1883, 233; JORDAN, Cat. Fish. N. Am., 98, 1885; JORDAN, in GOODE, Nat. Hist. Aquat. Anim., 275, 1884; JORDAN, Review Labroid Fishes, 633, 1890.

1993. PIMELOMETOPON DARWINII (Jenyns).

Head 3; depth 3. D. XII, 10; A. III, 12; scales 62. Snout pointed; outer lobes of caudal noticeably produced, as are also the soft dorsal and anal; preopercle entire. Color red; a large yellow blotch above the pectoral, and a black one anteriorly on the spinous dorsal. (Valenciennes.) Galapagos Islands; not seen by us. Evidently very closely related to *P. pulcher*, differing from the latter chiefly in color. (Named for its discoverer, Charles Darwin.)

Cossyphus darwinii, JENYNS, Voy. Beagle, Fishes, 100, pl. 20, 1842, Chatham Island, Galapagos. (Coll. Darwin.)

Labrus aper, VALENCIENNES, Voy. de la Vénus, Zool., Poiss., 338, pl. 8, f. 1, text, 1855: plates, 1846, Galapagos Island.

Trochocopus darwinii, GÜNTHER, Cat., IV, 100, 1862; JORDAN, Review Labroid Fishes, 633.

Pimelometopon darwinii, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 59.

634. CLEPTICUS, Cuvier.

Clepticus, CUVIER, Règne Animal, Ed. II, Vol. 2, 261, 1829 (*genizara*=*parræ*).

Anterior teeth small, bluntish, not canine-like; no posterior canine; mouth very small, terminal; snout short and blunt; dorsal and anal enveloped in scales, except produced tips of both fins; caudal deeply forked; dorsal spines 12, almost hidden by series of scales; head everywhere closely scaled, except on lips and snout; scales of body large; preopercle serrulate; gill rakers slender, short; pectoral falcate; lower pharyngeals very small, Y-shaped, their teeth small, very blunt, and coalescent; vertebrae 10 + 17 = 27. This genus contains a single species, a singular looking little fish, inhabiting the West Indian waters. It is remarkable for the close squamation of its head and fins, as well as for the feebleness of its dentition. (*κλεπτικός*, one inclined to steal; a name given to recall the affinity of the genus to *Epibulus*, from *ἐπίβουλος*, insidious; its Dutch name in Mollucca being *de Bedriger*.)

1994. CLEPTICUS PARRÆ (Bloch & Schneider).

(GENIZARA; JANISSARY; CREOLE.)

Head 3⅔; depth 2⅞. D. XII, 10; A. III, 12; scales 5-35-12; vertebræ 10 + 17 = 27. Body robust, considerably compressed; 4 rows of scales on cheek; pectorals falcate, slightly longer than head; dorsal and anal completely enveloped in a scaly sheath, produced soft rays of both fins naked except at base; produced dorsal ray nearly as long as head. Color in spirits, reddish brown anteriorly as far back as an irregular line connecting ventrals and last ray of dorsal fin, becoming coppery below; posteriorly insensibly shading into greenish marbled with verdigris green. This species seems to be rather rare in the West Indies. Here described from a single specimen nearly a foot long from Havana. West Indies, recorded from Cuba and Jamaica. (Named for Don Antonio Parra.)

Rabirubia genizara, PARRA, Dif. Piezas de Hist. Nat. Cuba, 44, pl. 21, fig. 1, 1787, Havana.

Brama parræ, BLOCH & SCHNEIDER, Syst. Ichth., 100, 1801, Havana; after *Rabirubia genizara*, of PARRA.

Clepticus genizara, CUVIER, Règne Animal, Ed. II, Vol. 2, 261, 1829, Havana; after PARRA; CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 367, pl. 377, 1839; GÜNTHER, Cat., IV, 112, 1862; POEY, Synopsis, 332, 1868; JORDAN, Proc. U. S. Nat. Mus. 1886, 45; JORDAN, Review Labroid Fishes, 635, 1890.

635. IRIDIO, Jordan & Evermann.

(DONCELLAS.)

Ichthycallus, JORDAN, Review Labroid Fishes, 638, 1890 (*dimidiata*); not of SWAINSON, as properly restricted = *Coris*.

Iridio, JORDAN & EVERMANN, Check-List, 412, 1896 (*radiatus*).

Body oblong, compressed, not elevated, covered with large scales, there being 25 to 30 in the course of the lateral line, which is not interrupted, but abruptly bent posteriorly. Scales on breast rather smaller. Head naked, compressed, conic. Preopercle entire. Teeth large, the upper jaw with 2 strong canines in front, none of them bent backward; lower jaw with 4 anterior canines, a posterior canine tooth directed forward on each side of the upper jaw. Dorsal spines 9; anal spines 3, graduated; ventrals inserted under axil of pectoral. Gill rakers short and feeble; gill membranes slightly joined to a narrow isthmus. Vertebræ $10+15=25$. Species numerous, most of them brilliantly colored, abounding in kelp in the tropical seas. All of them are American. The genus is very close to the Old World genus *Halichœres*,* differing chiefly in the dentition and in the presence of 3 anal spines instead of 2. (Iris, ἶρις, the rainbow.)

a. Caudal fin very slightly concave, truncate when spread open, the outer rays longer than the middle ones; body deep and compressed, the depth about $2\frac{3}{4}$ in length; ventral fins filamentous, the outer ray produced, more than twice as long as inner ray; scales before dorsal not crossing the middle line, in about 5 series.

b. Side below spinous dorsal without dark cross bar; general color bluish (♂), or bronze (♀), with many sky-blue spots, most distinct posteriorly; sky-blue spots and streaks on head; a stripe passing through the upper part of eye; fins with blue stripes; a dark axillary spot; end of pectoral dusky. RADIATUS, 1995.

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*-*Halichœres*, RÜPPELL, Neue Wirbelthiere, Fische, 16, 1835 (*bimaculatus*, etc.), not *Halichœrus*, NILSSON, 1820, a genus of seals.

Chœrojulis, GILL, Proc. Ac, Nat. Sci, Phila. 1862, 142; substitute for *Halichœres*.

The American species hitherto referred to *Halichœres* or to *Platyglossus* seem to constitute a distinct genus (*Iridio*) characterized by the incisors $\frac{2}{4}$, and the presence of 3 anal spines. The numerous species are all American, those of *Halichœres* being confined to the East Indies.

We also recognize as a genus distinct from *Halichœres*, the group called *Platyglossus* by Bleeker (type *marginatus*).

The dorsal in *Platyglossus* has a scaly sheath at its base somewhat as in the genus *Harpe*. The anterior canines in *Platyglossus* are $\frac{2}{2}$. In *Guntheria* Bleeker (*cœruleovittata*), *Hemitautoga* Bleeker (*centiquadra*), there are 2 rows of small scales on the cheeks, as well as on the opercles above. In *Macropharyngodon* Bleeker (*geoffroyi*), the strongest marked of the various genera of Bleeker, which Günther has united with *Platyglossus* and *Halichœres*, the lower pharyngeals are very small, provided with but 3 teeth, of which the middle one is quite large, In *Macropharyngodon* the canines are small, $\frac{4}{2}$ in number. All the American species here referred to *Iridio* have the anterior canines $\frac{2}{4}$. The East Indian species have the teeth $\frac{2}{2}$, except in 2 or 3 species, in which the teeth are $\frac{4}{2}$. In *Halichœres* the usual number of anal spines is 2. The name *Ichthycallus* should not be used for this genus. Jordan & Hughes remark (Proc. U. S. Nat. Mus. 1886, 57): "The generic names, *Chlorichthys* and *Ichthycallus* of Swainson, based in part on species of *Platyglossus*, but distinguished by imaginary characters and including species of earlier genera, have been very properly set aside by Dr. Gill as synonyms of *Coris* and *Julis*" (*Thalassoma*). A similar view has been taken by Dr. Swain, Proc. Ac. Nat. Sci. Phila. 1882, 275. Swain remarks: "*Chlorichthys* and *Ichthycallus*, confused jumbles of species, may well be considered as synonyms of *Thalassoma* and *Coris*, respectively, although several genera are represented in each."

bb. Side below spinous dorsal with a very broad, blackish cross bar.

c. General color bluish or olive; dark cross bar obscure, running from middle of spinous dorsal to the space between ventrals and vent; behind this a pale-yellowish bar; head and anterior region with round, pale-bluish spots, which extend on back and on the dark bar; dorsal bluish at base, yellowish above, with regular blue spots ringed with darker; a narrow, blue margin along edge of fin; caudal with obscure round bluish spots; anal like dorsal; pectorals and ventrals plain. NICHOLSI, 1996.

cc. General color red; dark cross bar conspicuous from the fourth to seventh dorsal spines downward to middle of sides; scales of sides each with a vertical blue line, those anteriorly margined with violet; sides of head with blue lines and spots; dorsal and caudal orange, the former with oblique broken lines of blue, the latter with a few blue spots at base; anal violet, then yellowish, then margined with blue, with a blue median line and broken blue lines at base; other fins pale. Head 3¼ in length; canines strong; scales on nape in 5 or 6 series, not crossing the median line; caudal very slightly emarginate; outer ray of ventral twice inner ray, and reaching vent. SELLIFER, 1997.

aa. Caudal fin rounded or subtruncate; the outer rays not produced, shorter than the middle rays.

d. Scales before dorsal reduced in size, extending across the median line, and in 10 to 13 rows; ventral short, its rays not filamentous; snout rather blunt; body moderately elongate, the depth 3¾ in length; color olivaceous, with some blue and bronze markings; males with a broad indigo-blue cross band behind pectorals; females with inky spots on the scales of the upper posterior part of back; pectorals yellow, with a black axillary spot. SEMICINCTUS, 1998.

dd. Scales before dorsal large, in 4 to 6 rows, not crossing the median line; snout moderately pointed.

e. Ventral fins with the outer rays produced, more than twice the length of the inner.

f. Side without conspicuous dark lateral band and with a distinct dark vertical bar, extending downward from spinous dorsal; axillary spot obscure; body rather elongate, the depth about 3¾ in length; profile not steep; posterior canines rather small; head with black streaks and spots above; caudal sharply barred. GARNOTI, 1999.

ff. Side with a broad blue-black lateral band extending from eye to tip of caudal, the back above this, dark brown or bluish; spinous dorsal with no conspicuous black spot; a dark-blue stripe from eye to nape; fins mostly blue-black with pale edgings; middle and base of caudal dusky; tip of pectoral dusky; profile rather steep; body rather robust, the depth 3⅓ in length. CYANOCEPHALUS. 2000.

ee. Ventral fins with outer ray not produced, its length not more than ½ that of inner rays; side with a dark lateral band; species of small size.

g. Spinous dorsal with a conspicuous blue-black spot between the fifth and seventh spines; body not very slender, the depth 3⅘ in length; a dark band from snout through eye to opercle, the lateral band on side broader than eye and placed a little above the opercular band, the lateral band extending nearly to tip of caudal; no second dark band below it; a faint dark spot under last dorsal ray and one at base of pectoral above; 2 or 3 narrow bluish-white stripes across cheek; body and fins in life with bright colors which fade in alcohol. MACULIPINNA, 2001.

gg. Spinous dorsal pale, the black spot very small or wanting; body slender, the depth 4 in length; opercle with a conspicuous black spot; a blue-black band from snout through eye and across opercles to base of caudal, not extending on the fin; a narrower and fainter band from lower base of pectoral to above anal, these bands growing fainter with age and sometimes disappearing, the lower always wanting in the adult; no axillary spot; no distinct bands across cheek; fins mostly pale, with bright red and blue colors in life, the young and deep-water individuals often showing a black spot at base of caudal and sometimes a dark spot near middle of dorsal with sometimes a larger one at the base of its last ray; angles of caudal black in adult; lower pharyngeals T-shaped, the anterior limb very short. BIVITTATUS, 2002.

aaa Caudal fin double concave, the median portion convex, the outer rays more or less produced in adult (the fin rounded in the young); scales before dorsal in 6 or 7 rows, not crossing the median line; a blue-black spot close behind eye, sometimes obsolete in the adult.

h. Lateral line with a round blue-black spot below fourth and fifth dorsal spines, the spot larger than eye; no spot behind eye; ventrals with the outer ray little produced, not reaching nearly to tips of pectorals; body rather stout, the depth about 3⅔ in length; profile steep; snout moderately pointed; no axillary spot; color olive; blue spots on the scales posteriorly, whitish spots anteriorly; head and caudal largely red in life; young with a dark lateral band, ending in the very young in a black spot. DISPILUS, 2003.

hh. Lateral line without blue-black spot; ventrals with the outer rays scarcely filamentous, about reaching tips of pectorals.

i. Tubes of pores of lateral line distinctly branched, the branches usually 3 in number; body moderately slender, the depth a little less than length of head and 3¾ to 4 in body; head 3⅗.

j. Eye large, 1⅔ in snout; snout not very sharp, the anterior profile of head steep and slightly convex; snout 2⅕ in head measured along the axis; pectoral shortish, 1⅔ in head; color in spirits olivaceous, with traces of 3 darker cross bands; dark spot behind eye large, with a distinct golden spot above it in some examples; a round black spot at base of last ray of dorsal; fins all pale in spirits, the anal edged with bluish; a bluish cross bar on base of pectoral. KIRSCHII, 2004.

jj. Eye small, 2⅔ in snout, brownish above, bright violet red below; many blue spots above; a crescent on base of pectoral; caudal edged with violet and with convergent streaks of yellow. POEYI, 2005.

ii. Tubes of pores of lateral line all simple or very nearly so, not trifid; body very slender, the depth much less than length of head, 4½ in body; head 3⅗; snout very sharp, the anterior profile of head straightish and not steep; snout 2⅕ in head; eye 2 in snout; pectoral moderate, 1⅗ in head; color, in spirits, pale, unmarked, except for the small black spot behind eye.

k. Color in life, olive green, bluish below; back with blue spots; a yellow band on sides with vague outlines; posterior parts paler, with rows of blue spots; head with blue bands; dorsal and anal rosy, with blue spots. CAUDALIS, 2006.

kk. Color in life, olivaceous; a broad band-like area of orange mingled with violet spots along sides backward from head to middle of body, the lower edge of this band serrate; below this a pale violet band, darker behind; still lower a yellow stripe; head olivaceous, marked with blue; preorbital scarlet, with 3 violet stripes; opercles bright red, with 3 violet stripes, the postocular black spot in the uppermost; dorsal and anal orange and yellow, with blue spots; caudal with convergent bands of orange forming reticulations around blue spots. PICTUS, 2007.

1995. IRIDIO RADIATUS (Linnæus).

(PUDDING-WIFE;* DONCELLA; PUDIANO VERDE.)

Head 3⅔ to 4; depth about 2¾. D. IX (rarely VIII), 11; A. III, 12; scales 2–28–10; eye 6½ in head; snout 3; pectoral 1⅓; highest dorsal spine 3½. Caudal fin very slightly concave, truncate when spread open, the outer rays longer than the middle ones; body deep and compressed; ventral fins filamentous, the outer ray produced, more than twice as long as inner rays; scales before dorsal not crossing the middle line, in about 5 series. Lower pharyngeal T-shaped, not much broader than long. Male fish largely olive, the lower parts deep bluish green; a bright orange olive area behind opercle, then a blue cross band with indefinite edges at vent, the rest of the body tinged with golden, the part above axis of body more or less orange brown; the whole upper half of body shows more or less orange shading; breast blue green; blue spots on scales less pronounced than in the female; head livid blue green, more or less striped and spotted with clear blue, the spots arranged as in the females, but less sharply defined; orange stripes and areas on top and front of head as in female, but the blue areas larger and more encroaching; dorsal and caudal alike in both sexes, the blue more pronounced in male; anal alike in both, but in the male the median stripe is of a rich grass green; pectoral in male with blue rays and bright grass-green membranes; ventrals similar, but the inner rays green; blue spot at base of pectoral above very intense; oblique bands from pectoral downward and backward similar in both sexes. In life the female of the "Pudding-wife" is of a rich translucent bronze olive, the belly becoming a livid pearly blue, tinged with creamy orange; a quadrate area before dorsal yellowish green, with abrupt edges and bounded by blue lines; 3 whitish saddle-like blotches below dorsal fin; a yellowish area on back of tail; top of head orange olive, with 3 rows of clear blue spots; a blue stripe from nape through upper part of eye to snout; a wavy stripe of blue just below eye; temporal region with curved streaks of bright blue; lips mostly blue; cheeks nearly plain; opercle light orange, with dashes of blue and violet, but without well-defined spots; middle of lower jaw light blue; a longitudinal streak on lower part of cheek; lower jaw light orange, with 2 blue cross bands; interopercle with a blue stripe; axil green; a yellowish-green shade from pectoral to caudal; a deep-blue spot at upper base of pectoral; 2 broad orange bars downward and backward from pectoral, the interspaces blue; each scale on body with vertical spot of vivid blue; on caudal peduncle these spots are brighter, becoming round below and horizontally oblong above; some of them on base of anal confluent in lines; mouth and gill cavity within white (livid blue in male); dorsal orange; a broad blue marginal stripe; a blue stripe at its base, interrupted behind; besides these a mesial stripe, breaking up posteriorly into about 3 rows of irregular curved spots; caudal orange, broadly tipped with yellow, its outer rays blue, its basal part with many irregular spots of light blue; anal with a basal row of blue spots, then an orange band, then a narrower stripe of bright blue, then a broad yellow band, then a row of blue spots, then orange, then an edge of sky blue; pectoral translucent, shaded with blue, and some pale orange; ventral with the spine and first soft ray blue, the membrane orange, the fin otherwise translucent. West Indies; common from Brazil north to the Florida Keys and Bermuda, and St. Pauls Rocks. Length 18 inches. Our specimens from Key West and Havana. This is the largest in size of the American species of *Iridio*, and one of those most readily recognized. Professor Goode has well described the variations due to age. This species is evidently the *Pudiano verde* of Marcgrave, the Pudding-wife of Catesby, and the *Doncella* of Parra. *Labrus radiatus* of Linnæus, in the tenth edition, is based solely on the Pudding-wife of Catesby. The Linnæan name, *radiatus*, must therefore be taken for this species. In the twelfth edition, *Labrus radiatus* disappears, and the pudding-wife appears as a doubtful synonym of a *Sparus radiatus*, which is based on a specimen of *Iridio bivittatus* sent by Dr. Garden from South Carolina. (*radiatus*, radiant, streaked.)

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* The formation of the name "Pudding-wife," from *Pudiano* and Old-wife, is an interesting freak of popular etymology.

Pudiano verde, MARCGRAVE, Hist. Pisc. Brasil., 146, 1648, Brazil; on a drawing by Prince MAURICE of Nassau.

Turdus oculo-radiato (Pudding-wife), CATESBY, Nat. Hist. Carol., II, 12, pl. 12, fig. 1, 1743, Bahamas.

Labrus radiatus, LINNÆUS, Syst. Nat., Ed. X, 288, 1758; based on CATESBY.

Doncella, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 95, lam. 37, fig. 1, 1787, Havana.

Labrus brasiliensis, BLOCH, Ichth., pl. 280, 1792, Brazil; on a drawing of the *Pudiano verde* by Prince MAURICE of Nassau; BLOCH & SCHNEIDER, Systema Ichthyol., 242, 1801.

Julis crotaphus, CUVIER, Règne Anim., Ed. II, Vol. 2, 258, 1829; based on *Doncella* of PARRA; no description.

Julis cyanostigma, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 391, 1839, Martinique.

Julis opalina, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 392, 1839, Martinique.

Julis patatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 398, 1839, Martinique; Cuba.

Julis principis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 402, 1839, Bahia.

Chlorichthys brasiliensis, SWAINSON, Class. Fish., etc., 232, 1839; name only.

Platyglossus cyanostigma, GÜNTHER, Cat., IV. 161, 1862; COPE, Trans. Am. Phil. Soc. 1871, 464; GÜNTHER, Shore Fishes, Challenger, 4, 1880.

Platyglossus principis, GÜNTHER, Cat., IV, 164, 1862.

Platyglossus radiatus, GÜNTHER, Cat., IV, 163, 1862; JORDAN, Proc. U. S. Nat. Mus. 1884, 135; JORDAN, Cat. Fish. N. Am., 98, 1885; JORDAN, Proc. U. S. Nat. Mus. 1886, 45; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 59.

Platyglossus opalinus, GÜNTHER. Cat., IV, 163, 1862.

Chœrojulis cyanostigma, POEY, Synopsis, 334, 1868, Havana; POEY, Enumeratio, 107, 1875.

Chœrojulis radiatus, GOODE, Bull. U. S. Nat. Mus., V, 35, 1875.

Halichœres radiatus, JORDAN, Review Labroid Fishes. 641, 1890.

1996. IRIDIO NICHOLSI (Jordan & Gilbert).

Head 3½; depth 3½. D. IX, 12; A. III, 11; scales 2–28–8. Body deep and compressed, head entirely naked; caudal fin slightly concave, truncate when spread open, the outer rays longer than the middle ones; ventral fins filamentous, the outer ray produced, more than twice as long as inner rays; scales before dorsal not crossing the middle line, in about 5 series. General color bluish or olive; side below spinous dorsal with a very broad, blackish cross bar somewhat obscure, running from middle of spinous dorsal to the space between the ventrals and vent; behind this a pale yellowish bar; head and anterior region with round pale bluish spots, which extend on back and on the dark bar; dorsal bluish at base, yellowish above, with regular blue spots ringed with darker; a narrow blue margin along edge of fin; caudal with obscure round bluish spots; anal like dorsal; pectorals and ventrals plain. Islands of the west coast of tropical America, Revillagigedos and Galapagos. This species was first described from a single specimen from Socorro Island. A second and larger example, 13½ inches long, taken by the *Albatross* at Charles Island in the Galapagos, shows the life coloration better than the type. This species is the Pacific representative of *Iridio radiatus*. Other specimens have been since obtained at the Revillagigedos by Dr. Gilbert. (Named for Capt. Henry E. Nichols, U. S. N.)

Platyglossus nicholsi, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 231, Braithwaite Bay, Socorro Island (Type, No. 28218. Coll. Nichols); JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 61.

Halichœres nicholsi, JORDAN, Review Labroid Fishes, 642, 1890.

1997. IRIDIO SELLIFER (Gilbert).

Head 3¼; depth 3¼. D. IX, 11; A. III, 12; maxillary 3½ in head; snout 2¾; eye 3 in snout; lateral line 28. Canines strong; scales on nape in 5 or 6 series, not crossing the median line; no scaly sheaths along dorsal and anal; caudal very slightly emarginate; outer ray of ventrals twice inner ray and reaching vent. General color red; dark cross bar conspicuous from fourth to seventh dorsal spines downward to middle of side; scales of sides each with a vertical blue line, those anteriorly margined with violet; sides of head with blue lines and spots; dorsal and caudal orange, the former with oblique broken lines of blue, the latter with a few blue spots at base; anal violet, then yellowish, then margined with blue, with a blue median line and broken blue lines at base; other fins pale. (Gilbert.) Revillagigedos Archipelago. This handsome species is known from a single specimen 11 inches long taken by Dr. Gilbert at Clarion Island. It is closely related to *Iridio nicholsi*, differing chiefly in its red color, a hue which is rare in the present genus. (*sella*, saddle; *fero*, I bear.)

Halichœres sellifer, GILBERT, Proc. U. S. Nat. Mus. 1890, 67, Clarion Island (Coll. *Albatross*); JORDAN, Review Labroid Fishes, 642.

1998. IRIDIO SEMICINCTUS (Ayres).

(KELP-FISH; SEÑORITA.)

Head 3½; depth 3½. D. IX, 12; A. III, 12; eye 7 in head; snout 3; scales 3-26-9. Body oblong, compressed, rather elevated at the nape; lips thick, the lower with a frenum; teeth in about 2 series, 3 or 4 of the anterior in each jaw canine-like; eye small; dorsal spines slender, low, and flexible; scales on breast small; scales before dorsal reduced in size, extending across the median line, and in 10 to 13 rows; ventrals short, their rays not filamentous; snout rather blunt. Dark greenish brown, with bright reflections; head bronze green above, 3 or 4 narrow, horizontal, wavy blue bands below the eye, alternating with bronze. Just above middle of body, close behind the pectorals in the males, is a deep indigo-blue cross band, which nearly meets its fellow under the belly; pectorals yellow, upper edge of axil black; ventrals cream color, each reaching beyond the posterior edge of the blue cross band; other fins with horizontal, wavy, reddish streaks; female without blue band, but with irregular ink-like spots on numerous scales on the back and tail. The coloration is comparatively plain, but that of the female is notably different from that of the male. The specimen described is from San Diego. Southern California, Santa Barbara Islands to Cerros Island; rather common in the kelp off shore. Length about a foot. (*semicinctus*, half-banded.)

Julis semicinctus, AYRES, Proc. Cal. Ac. Sci. 1859, 32, Cerros Island; male.
Platyglossus semicinctus, GÜNTHER, Cat., IV, 161, 1862; STEINDACHNER, Ichth. Beiträge, V, 151, 1876; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 455; JORDAN & GILBERT, Synopsis, 603, 1883; JORDAN, Cat. Fish. N. Am., 99, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 60.
Halichœres semicinctus, JORDAN, Review Labroid Fishes, 643, 1890.

1999. IRIDIO GARNOTI (Cuvier & Valenciennes).

Head 3½; depth about 3¾. D. IX, 11; A. III, 11; scales 3–26–9. Body rather elongate; profile not steep; posterior canines rather small; scales before dorsal large, in 4 to 6 rows, not crossing median line; snout moderately pointed; ventral fins with the outer rays produced, more than twice the length of the inner. Head olive, shaded with brown; bright violet blue on the lower jaw; dark violet dots and streaks behind and above eye; shoulders deep yellow olive; behind this a blackish cross band, behind which the back and base of the dorsal is a rich maroon-crimson; body below this livid purplish, shaded with olive; spinous dorsal olive, with blue dots; soft dorsal bluish, banded with bronze and edged with dusky; caudal bluish gray, with sharply defined narrow bronze bands; anal olive reddish, with streaks of crimson, violet, and blue; pectorals light reddish, their tips black; axil violet; ventrals pale; a diffuse dusky spot at upper base of caudal. Of this small species we have but 2 specimens, each about 8 inches long, from Havana. Poey notes that this species varies much in color markings. He regards his *Julis ruptus* as a synonym of *Julis cinctus*. The types of *Julis garnoti* examined by us in Paris belong to the same species. West Indies; recorded from Cuba, Martinique, and St. Croix. (Named for M. Garnot, a collector at Martinique.)

Julis garnoti, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 390, 1839, Martinique.
Julis cinctus, POEY, Memorias, II, 211, pl. 13, fig. 19, 1860, Havana.
Julis ruptus, POEY, Memorias, II, 212, pl. 13, fig. 20, 1860, Havana.
Chœrojulis ruptus, POEY, Synopsis, 334, 1868, Havana.
Platyglossus ruptus, COPE, Trans. Am. Phil. Soc. 1870, 464.
Platyglossus garnoti, GÜNTHER, Cat., IV, 162, 1862; JORDAN, Proc. U. S. Nat. Mus. 1886, 45; JORDAN & HUGHES, *l. c.*, 1886, 61; JORDAN, Proc. U. S. Nat. Mus. 1886, 541 (note on types of *Julis garnoti*).
Chœrojulis cinctus, POEY, Enumeratio, 108, 1875.
Halichœres garnoti, JORDAN, Review Labroid Fishes, 643, 1890.

2000. IRIDIO CYANOCEPHALUS (Bloch).

Head 3½; depth 3⅓. D. IX, 12; A. III, 12; scales 3–26–9. Body rather robust, profile rather steep, snout moderately pointed, the 4 to 6 rows of scales before dorsal fin not crossing the median line; ventral fins with the outer rays produced, more than twice the length of the inner. Deep olive green on head and back, the head bluer, then a broad lateral band of deep indigo extending from eye to tip of caudal, below this light clear green, then a darker bluish green; clear blue on lower jaw below and clear greenish blue on lower part of cheek; lateral band becoming faint on head; a dark streak along profile from snout to nape; a dark bluish band upward and backward from eye to nape, rather conspicuous, narrowed posteriorly; dorsal indigo, edged with sky blue; caudal green, indigo in center, yellowish at tip; anal indigo, then dull orange, then sky blue; ventrals green; pectorals plain greenish, indigo above. The Cuban species called *internasalis* is not different from the Brazilian *dimidiatus,* the alleged differences in color being due to defects in descriptions. A specimen before us from Bahia shows the band from eye to nape very distinctly. It is broader behind and edged with darker blue. We have also examined a smaller specimen from St. Lucia. Here described from 2 male specimens from Havana, each about 15 inches in length. West Indies, south to Brazil, generally common, reaching a length of 15 inches. (*κυάνεος*, blue; *κεφαλή*, head.)

Labrus cyanocephalus, BLOCH, Ichthyol., pl. 286, 1791, Museum of Link, locality unknown, probably Surinam.

Julis dimidiatus, AGASSIZ, in Spix, Pisc. Bras., 96, pl. 53, 1829, Brazil; CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 407, 1839.

Julis internasalis, POEY, Memorias, II, 421, 1860, Havana.

Ichthycallus dimidiatus, SWAINSON, Class. Fish., etc., 232, 1839; name only.

Platyglossus internasalis, GÜNTHER, Cat., IV, 164, 1862; COPE, Trans. Am. Phil. Soc. 1870, 463.

Chœrojulis internasalis, POEY, Synopsis, 334, 1868; POEY, Enumeratio, 108, 1875.

Platyglossus dimidiatus, JORDAN, Proc. U. S. Nat. Mus. 1886, 45; JORDAN & HUGHES, *l. c.*, 1886, 61.

Halichœres dimidiatus, JORDAN, Review Labroid Fishes, 644, 1890.

2001. IRIDIO MACULIPINNA (Müller & Troschel).

Head 3½; depth about 3⅘. D. IX, 11; A. III, 11; scales 2–28–9. Body rather stout; caudal fin rounded or subtruncate, the outer rays not produced, shorter than the middle rays; scales before dorsal in 4 to 6 rows, not crossing median line; snout moderately pointed; ventral fin with the outer ray not produced, its length not more than ½ that of inner rays. Side with a dark lateral band; spinous dorsal with a conspicuous blue-black spot between the fifth and seventh spines; a dark band from snout through eye to opercle, the lateral band on side broader than eye and placed a little above the opercular band, the lateral band extending nearly to tip of caudal; no second dark band below it; a faint dark spot under last dorsal ray and one at base of pectoral above; 2 or 3 narrow bluish-white stripes across cheek; body and fins in life with bright colors which fade in alcohol. Here described from a small specimen taken at Port

Castries, St. Lucia. Closely allied to *Iridio bivittatus*, but readily distinguished by the black dorsal spot and stouter form. West Indies, north to Beaufort, N. C. (*macula*, spot; *pinna*, fin.)

Julis maculipinna, MÜLLER & TROSCHEL, in Schomburgk, Hist. Barbados, 674, 1848, Barbados.

Platyglossus maculipinna, GÜNTHER, Cat., IV, 165, 1862; JORDAN, Cat. Fish. N. Am., 99, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 62.

Chærojulis maculipinna, POEY, Synopsis, 336, 1868.

Halichæres maculipinna, JORDAN, Review Labroid Fishes, 644, 1890.

2002. IRIDIO BIVITTATUS (Bloch).

(SLIPPERY DICK; DONCELLA.)

Head 3½; depth 4. D. IX, 11; A. III, 12; eye 6 in head; snout nearly 3; scales 2–27–8. Body very slender, compressed; head small and pointed. Caudal fin rounded or subtruncate, the outer rays not produced, shorter than the middle rays; scales before dorsal in 4 to 6 rows, not crossing the median line. Snout moderately pointed. Ventral fins with the outer ray not produced, its length not more than ½ that of inner rays. Lower pharyngeals T-shaped, the anterior limb very short. General color brownish; opercle with a conspicuous black spot; a blue-black band from snout through eye and across opercles to base of caudal, not extending on the fin; a narrower and fainter band from lower base of pectoral to above anal, these bands growing fainter with age and sometimes disappearing, the lower always wanting in the adult; no axillary spot; no distinct bands across cheek; fins mostly pale, with bright red and blue colors in life, the young and those from deep-water often showing a black spot at base of caudal, and sometimes a dark spot near middle of dorsal, with sometimes a larger one at the base of its last ray; angles of caudal black in adult. In life, greenish above, sides shaded with purple, the purplish color extending on the back, where it forms about 10 dark bars. Young with a brownish lateral band and a reddish stripe above it and below it. Many scales of posterior part of body each with a vertical spot of deep greenish blue, these smallest and bluest on caudal peduncle; blue, red, and greenish shades extending downward and backward from pectoral; a red band from each eye, these meeting on the nape; each bordering before with blue, behind confluent with a median reddish vertebral stripe which extends to front of dorsal; snout largely red; frontal region green; a red band through snout to edge of opercle edged by blue below, then yellowish and again red; lower jaw with 2 orange-red bands, its middle red in front, blue behind; throat reddish; opercle with a violet spot edged by green and orange; beyond this a <-shaped violet mark edged behind with yellow; dorsal bluish at base, then red, yellowish, red, and pale; sometimes, but not always, a violet spot at base of its last ray; caudal largely red, with oblique bluish and yellowish stripes, the corners more or less bluish, darkest in the adult; anal like dorsal; ventrals reddish; pectorals plain.

The young, types of *Platyglossus florealis*, are described as follows: Head 3⅓; depth 4. D. IX, 11; A. III, 12; scales 1½–26–8. Body rather slender, moderately compressed; snout not very sharp, 3½ in head. Eye moderate, 5 in head. Posterior canines small. Dorsal spines rather low, stiff and pungent, lower than soft rays; caudal truncate, 1⅗ in head; pectoral 1½ in head. Scales on breast small; head naked. Coloration in life, ground color olive brown; a rather dull olive-green stripe from above snout along sides of back to tail, midway between lateral line and dorsal; a brownish area along lateral line; below this a distinct dark-brown band from gill opening to middle of caudal on level of eye, and about as broad as eye, ending in a small dark spot at base of caudal; below this another light-brownish area bounded by a dark-bronze stripe on level of pectoral, the belly abruptly pale; each scale of side with a narrow crescent of deep greenish blue towards its base; these spots very distinct, especially anteriorly, giving the whole fish a bluish cast; sides of head pale orange; a bright blue wavy streak along preorbital, suborbital, and opercle, turning abruptly downward on the subopercle; a faint blue streak behind eye; opercle with a deep indigo-black spot bordered by bluish and yellow; tip of opercle yellow; the color bounded by a <-shaped blue line; lower jaw with 2 cross stripes of coppery orange, the interspaces white, the tip reddish; a small jet-black spot at base of last ray of soft dorsal; dorsal fin light cherry red, with a row of translucent spots at base; a narrow translucent median band, the tips translucent; caudal translucent, tinged with red toward the base; anal with a row of pearly spots, and a cherry-red band, then a narrow pearly band, then a light-yellow band, then a light-red band, the tips translucent; pectorals yellowish; ventrals white; iris scarlet. This species reaches a smaller size than any other of our representatives of the genus. It is also by far the most common in the waters of Florida and Cuba, and its range extends considerably farther north than any of the others. The variations due to age and to character of bottom are very considerable, having caused the establishment of several nominal species. In the description above quoted by Professors Jordan and Gilbert of specimens from Charleston, Pensacola, and Key West, these variations have been sufficiently indicated. Our Cuban specimens (from coral sand) are much paler in color than those farther north. The dark markings, however, remain similar. In old examples the dark lateral bands fade, sometimes becoming more or less broken; the corners of the caudal become dark, and there is usually a dark spot at base of last dorsal ray. Deeper water examples are quite pale or red with distinct longitudinal stripes, and the spot at base of caudal and at base of last dorsal ray distinct. Length 6 inches. West Indies, north to Charleston and Beaufort, North Carolina, south to Brazil; excessively abundant along rocky or weedy shores and reefs, commonly taken with hook and line by boys. (*bivittatus*, two-banded).

Sparus radiatus, LINNÆUS, Syst. Nat., Ed. XII, 472, 1766, Carolina; based on a specimen from Charleston, sent by Dr. Garden; not *Labrus radiatus* L., Ed. X.

Labrus bivittatus, BLOCH, Ichth., pl. 284, fig. 1, 1792, from a painting by Plumier, made at Martinique.

Labrus psittaculus, LACÉPÈDE, Hist. Nat. Poiss., III, 522, 1800, Martinique; from a copy of PLUMIER'S painting.

Julis humeralis, POEY, Memorias, II, 212, 1860, Havana; adult.

Chœrojulis grandisquamis, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 206, Beaufort, N. C.; adults, the color faint.

Chœrojulis arangoi, POEY, Enumeratio, 109, 1875, Havana; young, brightly colored.

Platyglossus florealis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 287, Pensacola; young, brightly colored. (Type, No. 30839. Coll. Dr. Jordan.)

Julis psittaculus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 387, 1839.

Platyglossus bivittatus, GÜNTHER, Cat., IV, 164, 1862; STEINDACHNER, Ichth. Notiz., VI, 49, 1867; COPE, Trans. Am. Phil. Soc. 1870, 463; JORDAN, Proc. U. S. Nat. Mus. 1884, 136; BEAN & DRESEL, Proc. U. S. Nat. Mus. 1884, 153; JORDAN, Cat. Fish. N. Am., 98, 1885; JORDAN, Proc. U. S. Nat. Mus. 1886, 45; JORDAN, Proc. U. S. Nat. Mus. 1886, 540 (note on types of *Julis psittaculus*, CUVIER & VALENCIENNES).

Platyglossus humeralis, GÜNTHER, Cat., IV, 165, 1862; JORDAN & GILBERT, Synopsis 603.

Chœrojulis bivittatus, POEY, Synopsis, 335, 1868.

Chœrujulis humeralis, POEY, Synopsis, 335, 1868; GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 338.

Platyglossus radiatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 608.

Platyglossus grandisquamis, JORDAN & GILBERT, Synopsis, 603, 1883.

Halichœres bivittatus, JORDAN, Review Labroid Fishes, 645, 1890.

2003. IRIDIO DISPILUS (Günther).

Head 3⅔; depth 3⅔. D. IX, 11; A. III, 12; scales 2–28–9. Caudal fin double concave, the median portion convex, the outer rays more or less produced in the adult (the fin rounded in the young); scales before dorsal in 6 or 7 rows, not crossing the median line; ventrals with the outer ray little produced, not reaching nearly to tips of pectorals; body rather stout; profile steep; snout moderately pointed. Color in spirits, olive, blue spots on the scales posteriorly, whitish spots anteriorly; a round blue-black spot on lateral line below fourth and fifth dorsal spines, the spot larger than eye; no spot behind eye (in the adult); 4 or 5 pale-blue wavy lines on side of head, the lower broadest; a pale-yellowish area behind pectoral with horizontal blue streaks; no axillary spot; dorsal and anal each with a brown longitudinal stripe; caudal (in male) blackish mesially, with blue streaks; a white stripe along each outer ray. Pacific coast of tropical America; Mazatlan to Panama. A beautiful little fish, abundant in the branches of the Astillero at Mazatlan. Unlike most species of the group, it lives on the muddy bottoms, and is abundant about the roots of the mangrove, which border the muddy branches of the Astillero. Here described from a specimen from Panama, agreeing fairly with Dr. Günther's description.

The following account is taken from Mazatlan specimens, which differ somewhat in color: Head 3⅓; depth 4. D. IX, 11; A. III, 12; eye 6 in head; snout 3⅓; maxillary 4¼; pectoral 1⅔; anal 3; caudal fin 2. Body slender and compressed; dorsal and ventral outlines similar; head pointed, the profile slightly convex; mouth small, the jaws equal; teeth in a single row; canines $\frac{2}{4}$ in front of jaws; at the posterior end of the premaxillary is a single strong, sharp tooth, pointing forward, and entirely below the angle of the mouth. Lateral line high, following the curve of the back to the eighth dorsal ray, where it curves sharply down through 2 rows of scales, and then runs straight through middle of caudal peduncle to tail; pores of lateral line simple; scales large, 2–27–10; head entirely naked; gill rakers very small and pointed, 6+7. Dorsal spines slender but pungent; caudal slightly rounded, the upper angle slightly acute; ventrals short, not filamentous; scales before dorsal in about 6 rows, not covering middle line. Color in life, olive green; a bright-blue streak, narrow and somewhat interrupted, from eye to base of caudal; a broader dark-bronze streak just below it, containing a series of small dark spots, mostly arranged in threes, the last one darkest, at base of caudal, just above middle line, these all obsolete in adult: below the bronze band, a faint blue streak, then a broad brown one, then a short one; bright sky blue bounding the belly, ending over middle of anal: belly and throat pearly white; head cherry red and bronze anteriorly, becoming olive behind, mottled with blue; a dark blue-edged spot behind eye; a large black spot smaller than eye below fifth dorsal spine, this spot crescent-shaped, bordered with yellow behind, mostly on 1 scale; a golden crescent at base of pectoral; dorsal bright orange, bluish below: caudal cherry red; anal bright orange; no spots on fins: iris red. Larger individuals deeper in color, the head cherry red, a dark spot bordered with blue behind eye; pectoral not black. In alcoholic specimens pearly streaks appear on sides of head and behind pectoral. (*δίς*, two; *σπίλος*, spot.)

Platyglossus dispilus. GÜNTHER, Proc. Zool. Soc. London 1864, 25. Panama; GÜNTHER, Fish. Cent. Am., 447, 1869: JORDAN & GILBERT, Bull. U. S. Fish Comm. 1882, 108: JORDAN, Cat. Fish. N. Am., 99, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 64.
Halichœres dispilus, JORDAN, Review Labroid Fishes, 646, 1890; JORDAN Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 481, pl. 45.

2004. IRIDIO KIRSCHII, Jordan & Evermann, new species.

Head 3⅖; depth 3¾ to 4. D. IX, 11; A. III, 12; scales 2–28–10; snout 2⅘ in head measured along the axis; eye 1⅔ in snout; pectoral shortish, 1⅔ in head. Body rather elongate, but deeper than in *I. caudalis*, the snout less acute; ventrals with the outer rays scarcely filamentous, about reaching tips of pectorals. Tubes of pores of lateral line distinctly branched, the branches usually 3 in number; body moderately slender, the depth a little less than length of head, snout not very sharp, the anterior profile of head steep and slightly convex. Color in spirits, olivaceous, with traces of 3 darker cross bands with pale interspaces and some traces of blue spots on scales; dark-blue spot behind eye large, with a distinct golden spot above it, very distinct in 2 specimens, obsolete in a larger one; a blue streak before eye; a round black inky spot at base of last ray of dorsal; fins all pale in spirits, the anal edged with bluish; a bluish cross bar on base of pectoral. Length about a foot. West Indies, south to Bahia; recorded from Cuba, Jamaica, Bahia, and St. Croix. Of this species we have examined the specimens called *Julis crotaphus* by Valenciennes, and 3 specimens taken by the *Albatross* at Bahia, the latter specimens (No. 43303, U. S. N. M.) being types of the present description. (Named for Dr. Philip H. Kirsch, fish commissioner of Indiana, in recognition of his work on American fishes.)

Julis crotaphus. CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 395, tab. 395, 1839, Bahia not of CUVIER, who based the species wholly on Parra's *Doncella*, *Iridio radiatus*.
Platyglossus crotaphus, GÜNTHER, Cat., IV, 163, 1862, COPE, Trans. Am. Phil. Soc. 1870, 463.
Chœrojulis crotaphus. POEY, Enumeratio, 109, 1875.
Halichœres poeyi, JORDAN, Review Labroid Fishes, 646, 1890; not of STEINDACHNER.
Iridio kirschii, JORDAN & EVERMANN, Check-List Fishes, 413, 1896, Bahia; name only.

2005. IRIDIO POEYI (Steindachner).

Head 3½; depth $3\frac{1}{12}$. D. IX, 11; A. III, 12; scales 2–28–10; eye small, 6½ in head including the opercular flap; snout slender, nearly 3 times diameter of eye; tubes of lateral line not described, perhaps as in *Iridio kirschii.* Lower half of body violet red, the upper reddish brown; each scale above with a deep-blue spot; a clear blue band downward and backward from the dark postorbital spot; a second from corner of mouth; a blue crescent on base of pectoral which widens into a blue axillary spot; caudal greenish with convergent streaks of yellow, edged with violet. Surinam (Steindachner); not seen by us; evidently close to *Iridio kirschii,* but the eye apparently smaller, the color different. (Named for Prof. Felipe Poey.)

Platyglossus poeyi, STEINDACHNER, Ichth. Notizen, VI, 49, 1867, Surinam.

2006. IRIDIO CAUDALIS (Poey).

Head about 3½; depth 4½ with caudal, 3⅚ without; eye 6 in head, 2 in snout; caudal rounded medially, concave toward its points, the upper lobe longer than lower; tubes of lateral line not described. Color olive green above, sky blue below; an olive spot surrounded by clear green on each scale; passage from sides to belly made insensibly by a yellow band; body becoming paler toward the tail; head with blue streaks, which extend on throat and base of pectorals, a green spot edged with dark blue behind eye, 2 series of round spots of cobalt blue, from caudal toward middle of trunk, where they disappear; blue on rays of caudal; dorsal and anal bright rose, crossed by 2 blue streaks, formed by series of blue points on dorsal, which has also a blue streak on its front; ventrals rosy; pectorals washed with blue; iris vermilion, with yellow. Length 160 mm. Cuba. (Poey); not seen by us; possibly the female of *Iridio pictus*, but probably a distinct species. (*caudalis*, from the form of the caudal.)

Julis caudalis, POEY, Memorias, II, 213, 1860, Havana.
Platyglossus caudals, GÜNTHER, Cat., IV, 166, 1862.

2007. IRIDIO PICTUS (Poey).

Head 3⅖; depth 4½. D. IX, 11; A. III, 12; scales 2–28–10. Tubes of pores of lateral line all simple or very nearly so, not trifid; body very slender, the depth less than length of head; snout very sharp; the anterior profile of head straightish and not steep; snout 2⅘ in head; eye 2 in snout; pectoral moderate, 1⅗ in head. Color in spirits, pale, unmarked, except for the small black spot behind eye; in life, olivaceous; a row of round sky-blue spots along each side of back; a broad band-like area of orange mingled with violet spots along sides backward from head to middle of body, the lower edge of this band serrate; below this a pale violet band, darker behind; still lower a yellow stripe; head olivaceous, marked with blue; preorbital scarlet, with 3 violet stripes; opercles bright red, with 3 violet stripes, the postocular black spot in the uppermost; dorsal and anal orange and yellow, with blue spots; caudal with convergent bands of orange forming reticulations around blue spots.

Another specimen is described as follows:

Head 3⅓; depth 4¼. D. IX, 11; A. III, 12; scales 2–25–6. Body very slender, compressed, the snout rather pointed, 3⅓ in head; eye moderate, 5½ in head. Posterior canine large. Dorsal spines low, rather slender, but pungent, lower than the soft rays; caudal fin convex, its 2 outermost rays somewhat produced; pectoral 1⅝ in length of head; scales on breast small; head naked. Color, when fresh, olivaceous above; a row of round sky-blue spots along each side of back; a broad band-like area of orange intermingled with violet spots along sides from lateral line about to level of eye, extending backward about to middle of body, the lower edge of the orange band serrate; below the orange a band pale violet, becoming posteriorly deep violet; still lower on level of lower edge of pectoral a deep yellow band about as wide as a scale, growing narrower and fainter behind; belly pearly; head above olivaceous, marked with blue; preorbital and suborbital region scarlet, with 3 violet-blue stripes, these margined with cherry red; cheeks below lowest violet stripe translucent yellowish; opercles bright red, with about 3 oblique violet stripes, the upper forming an oblique blotch behind eye, in the middle of which is a round black ink-like spot; no dark opercular spot; chin pearly; iris red; dorsal light orange, the soft part with 3 rows of violet spots; caudal orange, with 4 rows of spots, the orange arranged in 1 longitudinal, 2 marginal, and 2 convergent orange bands, which are connected by reticulations around blue spots; anal with a basal orange spot on each membrane, then a blue spot, then a broad yellow band, then a narrow blue band, and a terminal band of orange; ventrals light red; pectorals pale violet, yellow at base, a bluish oblique band below them; blue spots of head and posterior parts clear, sky blue; elsewhere of a violet shade and less bright.

West Indies, north to the Snapper Banks, off Pensacola.

This species is known to us from a number of specimens, all taken from stomachs of Groupers and Snappers on the Snapper Banks, between Pensacola and Tampa. We identify our specimens with the *pictus* of Poey, although while agreeing in the coloration of the head and in the form of the tail, they differ in some details. In *pictus*, according to Poey, the body is more slender, the depth 5½ in total length, the eye 2 diameters from the corner of the mouth. Color blue above; in front of middle of body the sides blood red, darker on the head; behind the middle the body is olive green; blue bands on the head; scales each with a bluish crescent; caudal with 3 orange bands which converge behind; dorsal and anal orange, the latter with 2 blue lines. It is probable, however, that *Julis pictus* is identical with our specimens, and perhaps *caudalis* is the female of the same, lacking the red shades on anterior half of body. (*pictus*, painted.)

Julis pictus, POEY, Memorias, II, 214, 1861, Havana.

Platyglossus pictus, GÜNTHER, Cat., IV, 166, 1862.

Platyglossus caudalis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 286; JORDAN, *l. c.*, 1884, 37; JORDAN & HUGHES, *l. c.*, 1886, 64; not of POEY.

Halichœres caudalis, JORDAN, Review Labroid Fishes, 647, 1890; probably not of POEY.

636. OXYJULIS, Gill.

(SEÑORITAS.)

Oxyjulis, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 330 (*modestus*).

Body very slender; the snout sharp; canines small, 2 above, 4 below; posterior canine small, or represented by a slight rudiment. Dorsal spines very slender and flexible, not all pungent, this character distinguishing the genus from *Julidio*. One species, ranging farther northward than any other of the *Julidinæ*. (ὀξύς, sharp; *Julis*.)

2008. OXYJULIS CALIFORNICUS (Günther).

(SEÑORITA.)

Head 4; depth 4½. D. IX, 13; A. III, 13; scales 28. Body very slender, strongly compressed; the head slender, with sharp snout; snout 3 in head; eye 5; anterior canines small, $\frac{2}{4}$, the upper larger and divergent; posterior canine extremely weak or wanting, rarely present on both sides; scales before dorsal much reduced, in 10 or 12 rows, those on breast considerably smaller than those on sides; dorsal spines slender and flexible, not at all pungent; caudal truncate; ventrals short, the first ray not twice the length of the inner ray. Color olive brown; centers of scales orange brown; belly cream color; sides of head with alternate streaks of brown and bluish; a large inky blue-black blotch at base of caudal, covering ⅓ of fin; membrane of base of spinous dorsal largely indigo blue; fins otherwise pale; lower pharyngeals essentially as in *Iridio*, the large teeth more acute. Length 7 inches. Coast of southern California; common about rocks and kelp from Monterey to Guadalupe Island; one specimen taken at Sausalito, San Francisco Bay. A pretty little fish, common in the kelp and among rocks.

Julis modestus, GIRARD, Proc. Ac. Nat. Sci. Phila., VII, 1854, 151, San Diego, Monterey, San Miguel; GIRARD, U. S. Pac. R. R. Sur., Fish., 163, 1858; GILL, Proc. Ac. Nat. Sci. Phila. 1862, 142; not *Julis modestus*, BLEEKER.

Halichœres californicus, GÜNTHER, Ann. Mag. Nat. Hist., ser. 3, Vol. VIII, 1861, 386, name only; substitute for *Julis modestus*, preoccupied.

Pseudojulis modestus, GÜNTHER, Cat., IV, 168, 1862; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 455; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 10; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 225; JORDAN & GILBERT, Synopsis, 604, 1883; JORDAN, Cat. Fish. N. A., 99, 1885.

Oxyjulis modestus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 331.

Oxyjulis californicus, JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 65.

Pseudojulis californicus, JORDAN, Review Labroid Fishes, 650, 1890.

637. EMMEEKIA, Jordan & Evermann.

Emmeekia, JORDAN & EVERMANN, Check-List, 413, 1896 (*venustus*).

This genus differs from *Pseudojulis* only in the presence of 4 canines in front of each jaw instead of 2; posterior canine wanting or represented by a slight rudiment; dorsal spines slender, but somewhat pungent.

(Named for Dr. Seth Eugene Meek,* assistant curator of zoology in the Field Columbian Museum, Chicago, in recognition of his work on American fishes.)

2009. EMMEEKIA VENUSTA (Jenkins & Evermann),

Head $3\frac{1}{3}$; depth $3\frac{1}{2}$; eye 5 in head. D. IX, 11; A. III, 11; scales 3–27–8. Body rather slender and compressed, its depth less than length of head; profile above eye nearly straight; head long and slender; snout long; eye small; caudal subtruncate; ventral short, its outer ray not produced, not reaching to tips of pectorals; posterior canine very weak or wanting, rarely present on both sides; scales before dorsal small, in 10 or 12 series; scales on breast small; canines slender, $\frac{4}{4}$. Color creamy orange, the back darker; many of the scales of back and upper part of sides each with a vertically oblong dark-brown spot; one of these at upper part of base of caudal more distinct than the others; a narrow dark bar across base of pectoral; a horizontal dusky streak through eye and snout; fins plain, pale; male with a vertical blue-black bar behind pectorals, much as in *Iridio semicinctus*. Gulf of California; rather common. Length 6 inches. A pretty little fish, known to us from numerous specimens collected at Guaymas by Jenkins & Evermann, and also from specimens taken in the Gulf of California by Dr. Gilbert. (*venustus*, pretty; from Venus.)

Pseudojulis venustus, JENKINS & EVERMANN, Proc. U. S. Nat. Mus. 1888, 145, Guaymas (Type, No. 39631. Coll. Jenkins & Evermann); JORDAN, Review Labroid Fishes, 649, 1890; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 160, pl. 2, fig. 5.

638. JULIDIO, Jordan & Evermann.

Julidio, JORDAN & EVERMANN, Check-List, 413, 1896 (*adustus*).

This genus agrees with *Iridio* in all respects except that the posterior canine is wholly wanting. Body robust; snout pointed; scales before dorsal large. Canines $\frac{2}{4}$; dorsal spines pungent. Caudal rounded. Species American. (From *Julis*, *ἰούλις*, a classical name of related species, from *ἰόν*, violet.)

a. Depth $2\frac{1}{3}$; head 3; ventrals rather long, reaching nearly to vent; the inner rays $1\frac{2}{3}$ in the outer; scales 2–27–8. Color brown, darker at bases of scales; pectorals pale; other fins black; soft dorsal, anal, and caudal with white margins, broadest at tip of caudal; sometimes pale wavy lines on head. ADUSTUS, 2010.

aa. Depth $3\frac{1}{2}$; head $3\frac{1}{2}$; ventrals short, the outer ray not nearly twice inner; scales 2–25–8. Color olive; young with a silvery lateral streak; back with 4 or 5 indistinct broad dark cross bands, these forming blotches on the dorsal fin, one of these on the first 3 soft rays largest and quite black; angles of caudal pale; ventrals whitish, with a broad black outer margin. NOTOSPILUS, 2011.

2010. JULIDIO ADUSTUS (Gilbert).

Head $3\frac{2}{7}$; depth $2\frac{2}{3}$ ($3\frac{1}{4}$ with caudal), 3 in young; snout 3; eye $2\frac{1}{2}$ in snout. D. IX, 11; A. III, 12; scales 27. Caudal peduncle $1\frac{2}{3}$ in length of head. Four strong canines in lower jaw, 2 in the upper, directed very obliquely forward. Scales not continued over median line of nape, 7 or 8 in front of dorsal; 7 or 8 series of scales on breast. No scaly sheaths at base of dorsal or anal; tubes of lateral line much branched, some of them occasionally simple. Caudal rounded, the outer rays not at all produced, $1\frac{3}{4}$ in head; ventrals rather long, reaching nearly to vent, the inner rays $1\frac{2}{3}$ in the outer; pectorals $1\frac{2}{7}$ in head; dorsal spines pungent. Color in spirits, everywhere warm brown, darker on the bases of the scales; pectorals lighter; other fins black, the soft dorsal, anal, and caudal, with a narrow white margin broader at tips of outer caudal rays. In one specimen there are traces of wavy lines on head, perhaps blue in life. Revillagigedo Islands; 3 specimens from Socorro Island, the longest 9 inches long. (*adustus*, brown or scorched.)

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* The natural derivative from "Meek" is preoccupied in Palæontology.

Pseudojulis adustus, GILBERT, Proc. U. S. Nat. Mus. 1890, 66, Socorro Island. (Type, No. 44275. Coll. *Albatross*.)

2011. JULIDIO NOTOSPILUS (Günther).

Head $3\frac{1}{2}$; depth $3\frac{1}{2}$. D. IX, 11; A. III, 11; eyes 6 in head; snout $3\frac{1}{5}$; scales 2–25–8. Body rather stout; snout pointed; profile not steep; dorsal spines pungent; first anal spine very slender, hardly distinguishable; caudal fin rounded; ventral fins with the outer ray not produced, its length not nearly twice that of the inner rays, its tip not reaching to tip of pectoral; scales before dorsal in about 6 series. Coloration of adult, blue green; bar across base of pectoral very bright; no dark spot behind eye; corners and tip of caudal pale, as in young; each scale of posterior part of body with a small sky-blue spot at tip; edges of scales bluish, the base olivaceous; axil blue, golden behind; breast and throat pale-salmon color, with bluish streaks and shades; cheek yellowish; snout blue. Young with blue spots more distinct, especially 1 behind eye. Adult with 4 dark shades on back extending on dorsal, the largest at front of soft dorsal; blackish spot diffuse, not ocellated; caudal with faint bluish cross streaks on faint bronze ground color, the angles broadly whitish; anal bronze with 3 bluish streaks, tip pale; ventrals dusky edged. Young colored like adult, but brighter, a paler olive streak from mouth across opercle above pectoral to base of caudal, this obsolete in adult; dorsal unlike that of adult; first dorsal bronze with bluish cross streaks, the large black blotch ocellated with blue and with a patch of bright yellow before and behind it, interspaces between this and the two other smaller black spots bright yellow also; blue spots in young more distinct, especially 1 behind eye, which disappears with age. Length 6 inches. Pacific Coast of Mexico; Mazatlan to Panama; generally common in rock-pools, especially about Mazatlan, where our specimens were taken. (νῶτος, back; σπῖλος, spot.)

Pseudojulis notospilus, GÜNTHER, Proc. Zool. Soc. London 1864, 26, Panama; GÜNTHER, Fish. Cent. Am., 447, 1869; JORDAN, Proc. U. S. Nat. Mus. 1885, 384; JORDAN, Cat. Fish. N. Am. 1885, 99; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 66; JORDAN, Review Labroid Fishes, 649, 1890; JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 480.

639. PSEUDOJULIS, Bleeker.

Pseudojulis, BLEEKER, Proc. Zool. Soc. London 1861, 412 (*girardi*).

Body elongate, compressed, covered with large scales; lateral line continuous; each jaw with 2 strong canines in front, and with no trace of posterior canines; dorsal with 9 pungent spines; anal with 3 spines. General character of *Halichœres,* from which genus *Pseudojulis* differs in the absence of posterior canines, and in having 3 anal spines. Species of small size found about rocky islands of the Pacific; the type, *Pseudojulis girardi,* is an East Indian species. (*ψευδής*, false; *Julis.*)

a. Dorsal spines slender and flexible; body very slender, the depth 5 in length; the head 2⅔; caudal truncate; pectorals and ventrals very short; scales not continuous across median line of nape, 6 series in front of dorsal. Color nearly uniform olivaceous; a faint dark streak forward from eye; a dark spot on each scale along the base of dorsal; scales along lower half of sides edged with pale; spinous dorsal dusky; a small black spot at base of fifth ray and 1 at base of last ray; fins otherwise plain translucent. INORNATUS, 2012.

aa. Dorsal spines slender, but pungent; body rather slender, the depth 4 in length; head 3; caudal rounded; pectorals and ventrals short; scales not continuous across median line of nape; 8 series before dorsal. Color olivaceous; the back and sides above with 7 broad dusky cross bars, the pale interspaces less than ½ their width, these bars not continued on the dorsal fin; a streak forward from eye, another backward; opercular flap with a jet-black spot, which has a broad pale margin; a round black spot at base of caudal above the median rays; a dusky spot on each side above vent, in front of which are 2 short silvery parallel lines down and forward, with traces of 4 others; a small jet-black spot between first and second dorsal spines; fins otherwise plain translucent. MELANOTIS, 2013.

2012. PSEUDOJULIS INORNATUS, Gilbert.

Head 2¾ (3½ in total); depth 5 (5⅔ in total length). D. IX, 12; A. III, 12; scales 1½–27–10. Body very slender; depth of caudal peduncle 11⅓; snout 3⅕ in head; maxillary 4⅔, equaling diameter of orbit, which is 1⅗ in snout, and equals interorbital width. Two canines only in front of each jaw; no posterior canines. Distance from front of dorsal to occiput equaling distance from latter to front of eye. Dorsal spines slender and flexible, longest soft ray 2⅗ in head; caudal truncate, the outer rays not produced, 1¾ in head; pectorals and ventrals very short, the outer ray of the latter not at all produced; pectorals 2 in head; ventrals 2⅗, not nearly reaching vent. Scales not continuous across median line of nape, 6 series in front of dorsal; scales on breast much reduced; 10 oblique series in front of ventrals; 18 scales along dorsal portion of lateral line; no scaly sheaths along the bases of fins. Color in spirits, nearly uniform olivaceous; a faint dark streak forward from eye to end of maxillary; a dark spot on each scale along base of dorsal, forming a faint dark streak; scales along lower half of sides edged with whitish (probably blue in life); spinous dorsal dusky, a small black spot at base of fifth ray, another at base of last ray; fins otherwise translucent, unmarked; iris bright silvery. This species is known from a single specimen, 3½ inches long, dredged by the *Albatross* off the west coast of Mexico, south of Cape San Lucas. (Gilbert.) (*inornatus,* not adorned.)

Pseudojulis inornatus, GILBERT, Proc. U. S. Nat. Mus. 1890, 67, west coast of Mexico, at Albatross Station 2829, lat. 22° 52′ N., long. 109° 55′ W., in 31 fathoms (Type, No. 44273); JORDAN, Review Labroid Fishes, 650, 1890.

2013. PSEUDOJULIS MELANOTIS, Gilbert.

Head 3 (3¾ in total length); depth 4 (4⅔ in total length). D. IX, 12; A. III, 12; scales 26. Body rather slender; snout 3¾ in head; eye 4⅓, equaling length of maxillary. Two anterior canines in each jaw; posterior canines not developed. Dorsal spines flexible, but pungent, the soft rays 2⅓ in head; caudal rounded, the outer rays not at all produced; pectorals and ventrals short, the outer ventral rays not produced, not reaching vent; pectorals 1⅔ in head. Scales not crossing median line of nape, much reduced on its anterior portion, in 8 oblique rows; scales on breast small, in 9 rows; no scaly sheaths to fins. Color in spirits, light olivaceous; the back and upper part of sides with 7 broad, dusky cross bars; the light interspaces less than ½ their width; these bars are distinct along dorsal outline, but are not continued on the dorsal fin; they become partly interrupted along dorsal portion of lateral line anteriorly, to become most prominent along middle of sides; the first bar is on the nape, the second under anterior dorsal spines; a dusky streak from eye forward to snout, and another backward toward opercular angle; opercular flap with a jet-black spot, widely margined posteriorly with white; a round black spot at base of caudal, above the median rays; a dusky spot on each side above vent, in front of which are 2 short parallel silvery lines running obliquely downward and forward; faint traces of about 4 other silvery lines in front of these and running parallel with them; a small jet-black spot on membrane between first and second dorsal spines; fins otherwise translucent, unmarked. Gulf of California. Known from 1 example 2¾ inches long, dredged by the *Albatross*. (Gilbert.) (*μέλας*, black; *οὖς*, ear.)

Pseudojulis melanotis, GILBERT, Proc. U. S. Nat. Mus. 1890, 67, Gulf of California, at Albatross Station 2825, lat. 24° 22′ 15″ N., long. 110° 19′ 15″ W., in 7 fathoms (Type, No. 44274); JORDAN, Review Labroid Fishes, 650, 1890.

640. CHLORICHTHYS, Swainson.

Chlorichthys, SWAINSON, Nat. Hist. Class. Fishes, II, 232, 1839 (*bifasciatus*, etc.).
Chlorichthys, JORDAN, Review Labroid Fishes, 651, 1890 (restricted to *bifasciatus*, etc.).

Body oblong or elongate, moderately compressed, covered with large scales; lateral line continuous; a slight sheath of scales along base of dorsal; no posterior canine; anterior canines $\frac{2}{2}$; dorsal spines always 8, usually slender; anal spines 3, the third slender, like a soft ray. Head naked; lower pharyngeals essentially as in *Halichœres* and *Iridio*. Species all American, so far as known, distinguished from the very closely related Old World genus, *Thalassoma* Swainson (=*Julis*, Günther; not of Cuvier) by the presence of 3 anal spines instead of 2. (*χλωρός*, green; *ἰχθύς*, fish.)

a. Caudal fin slightly lunate in the adult, truncate in the young.
  b. Body bicolor, the upper half blackish, the lower pale; body slender, the depth about 4 in length; ventrals shorter than pectorals, not filamentous; upper half of body dark purplish, the lower half abruptly rosy, the dark color of back

becoming gradually deeper downward, this forming a broad blackish lateral band, the edge of which curves upward at base of caudal; a faint brown streak below the dark; middle line of back black; head black, with 2 streaks downward and forward from eye; dorsal dark, with whitish margin; anal brownish, distal half pale; caudal yellowish, with 2 purple longitudinal bands extending upon the longest rays; axil with a purple dot; tip of pectoral dark; 6 small scales before dorsal. LUCASANUS, 2014.

bb. Body not bicolor.

c. Body rather deep, the depth 3 to 3¼ in length, equal to length of head; nape scaled on median line; 8 or 9 scales before dorsal; ventrals short, the outer rays not produced; interopercles meeting below throat; scales 27. D. VIII, 13; A. III, 11. Color deep brown, each scale on side with a vertical bluish bar at base and margined with pale blue; sides of head thickly covered with blue spots and broken lines, those on cheek radiating from eye; dorsal and anal purplish, a submarginal pale streak and a narrow white margin; a black blotch on front of spinous dorsal; caudal brown, the outer rays tipped with black; pectorals and ventrals purplish at base, with yellowish distal portion; dorsal spines strong. SOCORROENSIS, 2015.

cc. Body slender, compressed, the depth about 4 in length; ventrals much shorter than pectorals.

d. Ventrals 1½ in pectorals; olive, a violet lateral band, broken posteriorly; dorsal olive, with a white margin, darker below it; a dark blotch on 4 anterior spines; a dark streak on each caudal lobe; axil with a black spot. NITIDUS, 2016.

dd. Ventrals 2⅓ in pectorals; top of head and back brilliant yellow, this color extending on sides of head and to ventrals; a large yellow blotch on caudal fin; lower parts rosy white; a maroon band backward from eye, breaking up on body into a series of 6 quadrate spots of bottle green, the last blotch extending on outer rays of caudal; dorsal mostly greenish, with pale margin, a dark blotch between second and fifth spines; pectorals pale; ventrals yellow. NITIDISSIMUS, 2017.

aa. Caudal fin deeply forked, the outer rays much produced, especially in the adult.

e. Color not uniform deep green.

f. Pectoral fin with a large blue-black blotch near its tip; basal half of anal not violet black; head and caudal fin entirely bluish violet; edge of caudal pale; obscure paler streaks on side of head; breast to ventrals violet, paler than head; body violaceous, its anterior third paler, the scales posteriorly edged with dull violet; dorsal dull violet, its base paler, its edge whitish; anal with a violet stripe above the pale edge. STEINDACHNERI, 2018.

ff. Pectoral fin with a black blotch at its tip; body bicolor, the anterior and posterior halves different, anterior half deep blue, the head paler, posterior half bottle green, a deep-blue band across body covered by pectoral; a fainter one behind gill opening, the two perhaps sometimes coalescing; spinous dorsal dark; tip of pectoral dark; caudal pale, its lobes dark blue on the outer part; soft dorsal greenish; anal and ventrals bluish. BIFASCIATUS, 2019.

fff. Pectoral fin not black at tip; body not bicolor, bright green throughout, each scale with a purplish bar at base; head, nape, and belly purplish, the head with 4 green streaks on each side, margined with brown; these streaks continued backward as wavy green streaks on breast; dorsal and anal purplish, with a wide terminal green band nearly ½ width of fin; upper and lower caudal rays purplish, the median rays pale; pectorals and ventrals pale, a small black blotch at base of pectorals above. Head 3⅓: depth 3¼; scales covering median line of nape, 7 or 8 rows before dorsal; caudal deeply lunate in adult, the outer rays twice median ones; outer ventral rays produced, not quite twice inner rays; dorsal spines pungent. D. VIII, 13; A. III, 11. GRAMMATICUS, 2020.

ee. Color uniform bright green, without well-defined marks on head or body. Head 3 in length; depth about 3; scales continuous across nape; about 7 rows before dorsal; scales 27; outer caudal lobes much produced, 1⅓ in head; outer ventral rays filamentous; dorsal spines pungent. D. VIII, 13; A. III, 11. VIRENS, 2021.

2014. CHLORICHTHYS LUCASANUS (Gill).

Head 4; depth about 4. D. VIII, 13; A. III, 12; scales 2–26–8. Head rather pointed; dorsal spines pungent; ventrals not filamentous. Scales before dorsal small, 6 in number. Caudal lunate in adult, truncate in the young, the black outer rays produced somewhat beyond the others. A broad black band along side, its lower edge passing along lower edge of eye and upper edge of pectoral, then along middle of body curving upward to base of upper lobe of caudal; belly below this abruptly paler, brownish posteriorly; a faint brown streak along sides from behind pectoral to middle of caudal base; dark lateral band fading insensibly above into the brown hue of the back; upper part of back again black; head all dark, black above, the color gradually fading below to brown; 2 pale bluish streaks from lower part of eye downward and backward; a black spot at upper base of pectoral; dorsal black, with a narrow pale margin on the soft part; caudal pale, its upper and lower rays abruptly black, and narrowly edged with pale; anal brown at base, pale at tip; pectoral brown, with a blackish area toward the tip. Length about 3½ inches. Gulf of California, in rock pools. Known from Cape San Lucas, Mazatlan, and Tres Marias. Here described from 3 specimens (No. 37154, U. S. Nat. Mus.) brought from Tres Marias Islands by Alphonso Forrer.

Julis lucasanus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 142, Cape San Lucas; GÜNTHER, Cat., IV, 184, 1862; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 367.

Thalassoma lucasanum, JORDAN, Cat. Fish. N. Am., 98, 1885; JORDAN & HUGHES, *l. c.*, 1886, 68; JORDAN, Proc. U. S. Nat. Mus. 1888, 333; JORDAN, Review Labroid Fishes, 652, 1890.

2015. CHLORICHTHYS SOCORROENSIS (Gilbert).

Head 3 to 3¼; depth 3 to 3¼. D. VIII, 13; A. III, 11; scales 2–27–8. Depth of caudal peduncle 2⅕ in head; maxillary 3½; snout 2⅔; interorbital 4⅓. Interopercles meeting below on median line of throat. Scales reduced on breast and nape, the latter scaled over median line; 8 or 9 scales in a row along nape, arranged in 5 or 6 oblique series; 13 oblique rows on breast; well-developed scaly sheaths along bases of dorsal and anal, and series of scales running out on membranes between rays of caudal. Outer caudal rays little produced, the outline of fin greatly concave, longest ray equaling length of head in front of preopercular margin; ventrals short, the outer rays not produced, the inner rays contained 1⅖ in length of outer; pectorals short and broad, 1¾ in head; dorsal spines strong and sharp. Deep brown, each scale on sides with a vertical bluish bar at base, narrowly margined with light blue; sides of head thickly covered with small purplish or bluish spots and broken lines margined with darker blue, those on cheeks arranged in lines radiating from the eye; dorsal and anal purplish, a submarginal light streak (probably blue in life), and a narrow white margin; a black blotch on anterior rays of spinous dorsal; pectorals and ventrals purplish at base, with more or less orange or yellow on distal portion; caudal brownish, the outer rays tipped with black. Revillagigedo Archipelago, abundant at Socorro Island; the longest specimen known, 10½ inches long. (Gilbert.)

Thalassoma socorroense, GILBERT, Proc. U. S. Nat. Mus. 1890, 69, Socorro Island (Type No. 43084. Coll. *Albatross*); JORDAN, Review Labroid Fishes, 653, 1890.

2016. CHLORICHTHYS NITIDUS (Günther).

Head 3¾ (4¼ in total); depth 4 (4½ in total). D. VIII, 13; A. II (III), 11; scales 2–26–8. No posterior canine tooth. Dorsal spines pungent, shorter than the rays; caudal lobes very slightly produced; the length of the ventral ⅔ of that of the pectoral. Color in spirits, a violet band, united with its fellow on the snout, runs through the eye and across the bend of the lateral line to the caudal, sometimes broken up into large spots, forming a single series; dorsal fin brownish, darkest toward the margin, which is white; a black blotch between the 4 anterior spines; anal white; caudal with a blackish streak along each lobe; a black spot superiorly in the axil of the pectoral, which is transparent. Jamaica (Günther); not seen by us. Length 3 inches. (*nitidus*, shining.)

Julis nitida, GÜNTHER, Cat., IV, 190, 1862, Jamaica. (Coll. Dr. Parnell.)
Thalassoma nitidum, JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 68; JORDAN, Review Labroid Fishes, 653, 1890.

2017. CHLORICHTHYS NITIDISSIMUS (Goode).

Head 3¾; Depth 4. D. VIII, 13; A. III, 11; scales 2–26–8. Body slender, compressed; ventrals very short, 2⅓ in pectorals. Top of head and back brilliant yellow, this color extending on sides of head and to ventrals; a large yellow blotch on caudal fin; lower parts rosy white; a maroon band backward from eye, breaking up on body into a series of 6 quadrate spots of bottle green, the last blotch extending on outer rays of caudal; dorsal mostly greenish, with pale margin, a dark blotch between second and fifth spines; pectorals pale; ventrals yellow. Bermudas (Goode); not seen by us; probably not distinct from *Chlorichthys nitidus*.[*] (*nitidissimus*, most shining.)

Julis nitidissima, GOODE, Am. Jour. Sci. and Arts 1877, 293, Bermuda. (Coll. Goode.)

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[*] In describing *Julis nitidissima*, Professor Goode indicates his suspicion that it is identical with *Julis nitida*. The only tangible distinction would be in the length of the ventrals, ⅔ the pectorals in *C. nitidus* and 3/7 in *C. nitidissimus*. The other differences may be due to the fact that the type of *nitidissimus* was freshly caught; those of *nitidus* preserved in alcohol.

2018. CHLORICHTHYS STEINDACHNERI (Jordan).

Head 4 in total, to end of middle caudal rays; depth 5; scales 2–27–9. Caudal deeply forked, its produced rays, as also the head, bluish violet; lower and posterior edge of caudal pale; obscure paler streaks on side of head; breast to ventrals violet, paler than head; body violaceous, its anterior third paler, the scales posteriorly edged with dull violet; dorsal dull violet, its base paler, its edge whitish; anal with a violet stripe above the pale edge. Pectoral fin with a large blue-black blotch pointed forward toward its tip. Acapulco; 1 specimen 5½ inches long (Steindachner); not seen by us.

Dr. Steindachner observes: "An example caught at Acapulco agrees on the whole so closely with *Julis melanochir* that I can only on account of its color regard it as a variety of that species. *Julis melanochir* comes very abundantly on the coast of the Sandwich Islands, and it may from thence extend its range to the west coast of North America, which, on the whole, possess but few Labroids." Inasmuch as this account of the Acapulco fish differs considerably from *Julis melanochir* as shown in Bleeker's figure, and as the Labroid fauna of the west coast of Mexico is in general wholly unlike that of the western Pacific, it is probable that the fish from Acapulco is not identical with *Julis melanochir*.

(Named for Dr. Franz Steindachner, the discoverer of the species.)

Julis melanochir, STEINDACHNER, Ichth. Beitr., III, 63, 1875, specimen from Acapulco; not of BLEEKER, Act. Soc. Sc. Indo Nederl., VIII, 77, 1859.

Thalassoma steindachneri, JORDAN, Review Labroid Fishes, 654, 1890, Acapulco; after STEINDACHNER.

2019. CHLORICHTHYS BIFASCIATUS* (Bloch).

Head 3½; depth 3⅔. D. VIII, 13; A. II, 11; scales 2–27–9. Caudal fin deeply forked, the outer rays much produced, especially in the adult. Body bicolor, the anterior and posterior halves different; anterior half deep blue, the head paler, posterior half bottle green, a deep blue band across the body covered by pectoral; a fainter one behind gill opening, the two perhaps sometimes coalescing; spinous dorsal dark; tip of pectoral dark; caudal pale, its lobes dark blue on the outer part; soft dorsal greenish; anal and ventrals bluish. West Indies; not uncommon; known from Cuba, Jamaica, San Domingo, and Martinique. (*bifasciatus*, two-banded.)

Labrus capite obtuso, GRONOW, Zoophyl., No. 243, 1781, Antilles.

Labrus bifasciatus, BLOCH, Ichthy., 131, pl. 283, 1792, West Indies.

Labrus bifasciatus var. *torquatus*, BLOCH & SCHNEIDER, Syst. Ichth., 243, 1801, Antilles; after GRONOW.

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* "Head and iris very dark purple; body to tip of pectorals black, posteriorly green, the bases of the scales darker; caudal peduncle dusky; greenish on sides; a pale greenish band across back and sides through front of spinous dorsal; outer rays of caudal black, inner white; spinous dorsal black, soft dorsal greenish with a pale margin; anal greenish, dusky anteriorly; pectoral white, the tips and base black; outer rays of ventrals black, others pale; head without color markings, but the numerous pores on the cheek seem to have mucous tubes radiating from the eye. Pectoral black at tip." (Jordan and Rutter: Specimens from Jamaica.)

Julis detersor, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIII, 408, 1839, San Domingo; Martinique; GÜNTHER, Cat., IV, 186, 1862.

Labrus ornatus, GRONOW, Syst. Nat., Ed. Gray, 83, 1854, Antilles; after *Labrus capite obtuso*; not of CARMICHAEL.

Julis gillianus, POEY, Memorias, II, 214, 1860, Cuba.

Chlorichthys bifasciatus, SWAINSON, Nat. Hist. Class. Fish., II, 232, 1839.

Julis bifasciata, GÜNTHER, Cat., IV, 186, 1862.

Julis bifasciatus, POEY, Enumeratio, 107, 1875.

Thalassoma bifasciatum, JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 68; JORDAN, Proc. U. S. Nat. Mus. 1886, 540 (types of *Julis detersor*); JORDAN, Review Labroid Fishes, 654, 1890.

Thalassoma bifasciatus, JORDAN, Review Labroid Fishes, 56.

2020. CHLORICHTHYS GRAMMATICUS (Gilbert).

Head 3½ to 3¾; depth 3 to 3½; eye 2½ in snout. D. VIII, 13; A. III, 11. Maxillary 4½ in head; snout 3; interorbital width 4. Two canines in front of each jaw; no posterior canines; teeth gradually enlarging toward front of each jaw, those next the anterior pair not more than ⅔ their length. Interopercles greatly produced, meeting or overlapping on median line below. Scales somewhat reduced on nape and breast, continuous over median line of nape; 7 or 8 oblique rows in front of dorsal, 9 or 10 series in front of ventrals; well-defined sheaths at bases of dorsal and anal. Caudal fin very deeply lunate, the outer rays greatly produced, forming lobes nearly twice as long as median rays in the adult, but little produced in the young; outer ventral rays produced, not twice length of inner rays, not reaching vent; pectorals 1⅕ in head; dorsal spines pungent. Bright green, each scale of sides with a purplish bar at base; head, nape, breast, and belly purplish, the head with 4 green streaks on each side margined narrowly with brown; the lowermost bar runs on mandible, lower preopercular margin, and interopercle; the second runs from mandibular articulation across cheek and subopercle, showing a strong upward curve below eye; the third is nearly parallel with the second, running from angle of mouth to opercular margin, passing through lower margin of orbit; the fourth runs backward from orbit to upper posterior angle of opercle, then downward along margin of opercle to base of pectoral; these streaks are continued backward more or less as wavy green streaks on breast and sides below pectorals; dorsal and anal purplish with a wide terminal green bar nearly ½ as wide as fin; upper and lower caudal rays purplish, the median rays light; pectorals and ventrals light purplish; a small black blotch on base of pectorals above. Revillagigedo Archipelago; abundant at Socorro Island; a single specimen from Clarion Island, the largest obtained, 11½ inches long. (Gilbert.) (*γραμματικός*, streaked.)

Thalassoma grammaticum, GILBERT, Proc. U. S. Nat. Mus. 1890, 68, Socorro Island; Clarion Island (Type, No. 43083. Coll. *Albatross*); JORDAN, Review Labroid Fishes, 655, 1890.

2021. CHLORICHTHYS VIRENS (Gilbert).

Head 3; depth about 3. D. VIII, 13; A. III, 11; scales 27. Depth of head 1¼ in its length; maxillary 3½ in head; snout 2⅖ to 2⅗; eye 3⅓ in snout; interorbital width ½ snout. Two strong canines in front of each jaw, the other teeth increasing in length anteriorly, but not nearly equaling anterior pair; no posterior canines. Scales on breast and nape reduced in size, the latter continuous over the median line of nape, in about 7 rows in front of dorsal; about 10 oblique rows on breast; 27 or 28 transverse rows on sides; 2 full series of scales above lateral line, and 4 or 5 small scales along base of fin. Depth of caudal peduncle 2⅕ in head; outer caudal lobes greatly produced, 1⅓ in head, the middle portion truncate, ½ length of head; outer ventral rays produced, but not nearly reaching anal, twice the length of the inner rays, ½ length of head; pectoral 1⅗ in head. Dorsal spines strong, pungent. Uniform bright green, without distinguishing streaks or spots on head or body. Revillagigedo Archipelago; very abundant at Socorro Island; the largest specimens seen, 13 inches long. (Gilbert.) (*virens*, green.)

Thalassoma virens, GILBERT, Proc. U. S. Nat. Mus. 1890, 68, Socorro Island (Coll. *Albatross*); JORDAN, Review Labroid Fishes, 655, 1890.

641. DORATONOTUS, Günther.

Doratonotus, GÜNTHER, Cat. Fishes Brit. Mus., IV, 124, 1862 (*megalepis*).

Body compressed; head not compressed to an edge anteriorly, its profile in front straight or concave; preorbital not very deep; mouth rather wide; teeth in a single series, 2 large canines in front of each jaw; a posterior canine; cheeks and opercles scaly; gill membranes united, free from the isthmus; scales large; lateral line interrupted behind, beginning again lower down; dorsal fin with 9 strong pungent spines, some of the anterior elevated, the median spines short, so that the outline of the fin is concave; caudal rounded. Colors brilliant. Size small. This genus contains a single species, one of the most beautiful of the *Labridæ*, and the genus to which it belongs is one of the best defined in the group. (*δόρατος*, spear; *νῶτος*, back.)

2022. DORATONOTUS MEGALEPIS, Günther.

Head 2¾; depth 2⅔. D. IX, 10; A. III, 9; scales 1½–20, 6½ pores. Body much compressed, moderately elevated, its greatest width behind head 2/7 of its height; caudal peduncle short and deep, its length but little more than ½ its height; profile from dorsal to nape convex, carinated; occiput and supraorbital region depressed and flat, the snout protruding, the profile of top of head thus strongly concave. Snout slender, sharp, compressed, its length 3⅕ in head; mouth wide; maxillary 4 in head; teeth growing gradually larger anteriorly, the 2 front teeth in each jaw distinctly the largest, canine-like, diverging, opposed to each other; a small but distinct posterior canine in upper jaw, none in the lower; eye moderate, little wider than interorbital width, 5 in head; cheeks with a single series of large scales, 4 in number; opercle covered with 5 or 6 similar scales; gill membranes broadly united, free from the isthmus. Dorsal spines robust and pungent, the first 3 with conspicuous filamentous appendages; first and second spines with their filaments about equal, 1½ in head; without their filaments the second spine is slightly the longest, equaling distance from end of snout to middle of eye; the fin rapidly descends to the fourth spine, which is ½ as long as the second, then gradually rises to the ninth and highest, which is, however, shorter than the following soft rays; longest soft ray 1⅔ in head; anal spines similar to those of dorsal fin, the longest about ½ head; caudal evenly convex, its longest ray 1½ in head; ventrals short, about ½ length of head, an elongate scale between them at base; pectorals reaching beyond the ventrals, but not to vent, 1¾ in head. Membranes of vertical fins, with elongate scales on basal portion; lateral line following outline of back 1 scale beyond end of dorsal fin, thence interrupted and continued on 4 scales of middle of caudal peduncle. Color in life, very intense grass green, about uniform over the body; head more yellowish, slightly paler below; opercles mesially a little darker; iris red, with a green ring; dorsal, anal, and caudal grass green, mottled with light orange; tips of lower spines green, of short ones orange; ventrals deep green, the membranes largely orange; pectorals light yellowish. Length 2¾ inches. West Indies north to Key West,* rare. Here described from the type of *Doratonotus thalassinus*, obtained with a seine in eelgrass at Key West. One of the most beautiful of American fishes. (*μέγας*, large; *λεπίς*, scale.)

Doratonotus megalepis, GÜNTHER, Cat., IV, 125, 1862, St. Kitts; JORDAN, Review Labroid Fishes 655, 1890.

Doratonotus thalassinus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 28, Key West. (Type, No. 34969, U. S. N. M. Coll. Jordan.)

642. XYRULA, Jordan.

Xyrula, JORDAN, Review of Labroid Fishes, 656, 1890 (*jessiæ*).

Scales very large, about 20 in the lateral line, which is placed on the first row of large scales below the dorsal sheath; head not trenchant above, otherwise as in *Xyrichthys*. A single species from rather deep water. (A diminutive, suggested by *Xyrichthys*.)

2023. XYRULA JESSIÆ (Jordan).

Head 3⅔; depth 3⅕. D. IX, 12; A. (probably) III, 12; scales about ½-20-7. Body oblong, rather more elongate and rather less compressed than in species of *Xyrichthys*. Head rather less deep and less trenchant anteriorly and superiorly than in *X. psittacus*, its anterior outline boldly convex rather than parabolic. Depth of preorbital from eye to angle of mouth 2⅓ in head (2$\frac{1}{10}$ in *X. psittacus*). Cleft of mouth 4⅓ in head; anterior incisors strong, $\frac{2}{2}$ as in *X. psittacus*. Eye moderate, 4⅓ in head. No trace of scales on cheeks; length of cheek a little more than ½ its height (much less than ½ in *X. psittacus*). Scales very large, the lateral line running along the back on the first complete series of scales. (Owing to the injuries which the specimen has received the number of scales can not be exactly counted. It is, however, apparently 20 or 21.) Between the sixth spine and the seventh soft ray of the dorsal 8 scales remain. In the same distance on *X. psittacus* there are 11 scales, the total number in the lateral line being about 27. The fins are all injured by the digestive process, and are not evidently different from similar parts in *X. psittacus*. The dorsal spines seem rather more slender, the anterior spines not produced, the soft rays of the ventrals filamentous. Color in life, uniform scarlet red; the sides more yellowish; no blue spots or lines anywhere. Snapper Banks off Tampa Bay, Florida; from the stomach of a large grouper; the type in rather bad condition on account of having been partly digested. Length of typical example 6¾ inches. (Named for Mrs. Jessie Knight Jordan.)

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* Of this exquisite little fish only 5 specimens are known: (1) The type of *D. megalepis*: a specimen in poor condition from St. Kitts; (2) the type of *D. thalassinus*, a specimen in fine condition from Key West, now in the U. S. National Museum; (3) a third specimen sent by Professor Poey from Havana to the museum at Cambridge; and (4) 2 specimens taken by Dr. James A. Henshall at Garden Key. These last specimens have the snout less slender than in the original types, but this difference may be due to their greater age.

We have little doubt of the identity of *D. thalassinus* with *D. megalepis*, the slight differences in the descriptions being apparently due to the poor condition of Dr. Günther's specimens.

Xyrichthys jessiæ, JORDAN, Proc. U. S. Nat. Mus. 1887, 698, off Tampa Bay. (Type, No. 39420. Coll. Chas. H. Bollman.)
Xyrula jessiæ, JORDAN, Review Labroid Fishes, 656, 1890.

643. NOVACULICHTHYS, Bleeker.

Novaculichthys, BLEEKER, Proc. Zool. Soc. London 1861, 414 (*macrolepidotus*).
Dimalacocentrus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 223 (*kallosoma*); "first two dorsal spines more or less detached."

This genus is very close to *Xyrichthys*, from which it differs chiefly in having the upper profile of the head more or less obtuse, not cultrate; the preorbital is less elevated than in *Xyrichthys*, and the first 2 dorsal spines are flexible, sometimes spaced, produced, or otherwise distinguished from the others, but not forming a separate fin; ventrals sometimes produced; cheeks naked, or with a few small scales below the eye. Species rather numerous; the group apparently intergrading with *Xyrichthys*. (*novacula*, razor; ἰχθύς, fish.)

a. Two anterior spines of dorsal flexible, sometimes elevated, always different from the remaining spines; ventral fins much produced in the adult, shorter in the young; a few scales below eye.
  b. Scales 23 or 24; third and fourth spines of dorsal lowest, the spines thence slightly increasing to the last; second spine connected by a membrane with the third; first and second spines elevated, 1½ in head; caudal rounded; a series of small scales below eye; head otherwise naked. Color (male) light olive, head more yellowish; body with 5 brownish cross bars, the first obscure at the nape, the last forming a blotch at base of caudal; a small yellowish spot at base of caudal and a fainter one above it; cheeks and lower jaw banded; an olive blotch on opercle; some brown dots behind eye; dorsal cherry red, paler posteriorly, darkest on produced anterior rays; caudal pale; anal cherry red, with 2 spots of deeper red; pectorals plain; ventrals deep cherry red. Female, orange brown, much mottled, 5 cross bands, darker and broader than in the male; 2 yellowish-brown bands across from eye over lower jaw; 2 similar bands across breast before ventrals; caudal and pectorals plain; ventrals deep brownish red. ROSIPES, 2024.

bb. Scales 26; dorsal and caudal faintly barred; ventrals much produced, their color pearly; first 2 dorsal spines flexible, not much produced. VENTRALIS, 2025.

aa. Two anterior spines of dorsal similar to the others, none of them pungent; ventrals moderate, not reaching anal.

c. Cheek below eye with a row of 4 or 5 small scales; head 3⅓; depth 3½; scales 27; grayish, dorsal edged with darker; axil blackish, some streaks on head. INFIRMUS, 2026.

cc. Cheek below eye without scales; anterior profile of the head not very steep and not trenchant; head 3⅗ in length; depth 3⅘; scales 2–29. Color in spirits, reddish, the fins dark (in the male); head without evident blue lines; a blue vertical streak on each scale, as in other species; no silvery blotch, and no inky spot on body. MARTINICENSIS, 2027.

2024. NOVACULICHTHYS ROSIPES (Jordan & Gilbert).

Head 3⅖; depth 3⅕. D. IX, 13; A. III, 12; scales 2–23 or 24–8. Body sharply compressed and of moderate height, the anterior profiles not compressed to a sharp edge, the upper profile descending in a regular gentle curve from dorsal fin to end of snout, thus much less nearly vertical than in most species of the genus; the snout comparatively long and pointed, the preorbital low; maxillary nearly reaching vertical from front of orbit, 3½ in head; teeth as usual, no posterior canines; height of preorbital 5⅓ in head; eye large, 1½ times interorbital width, 3⅗ in head (in young); distance from snout to eye ⅓ head; a series of small scales below eye, head otherwise naked. Two anterior dorsal spines (in young) much elevated, with filamentous tips, their length ⅔ that of head; the third or fourth spine is the lowest, the spines thence slightly increasing to the last; second spine connected by membrane with the third; longest soft ray of dorsal about 2¾ in head; caudal rounded, 1⅕ in head; ventrals 1⅘; pectorals 1½. The young male described above, 2 inches long, had the following coloration in life: Light olive, scarcely paler below, the head more yellowish; body with 5 irregular brownish cross bars, the first obscure at the nape, the last forming a blotch at base of caudal; a small yellowish spot at middle of base of caudal and a fainter one above it; a dark-olive band downward from eye, with a spot-like band of the same color before it, and another, which becomes yellow, on the cheek behind it; all 3 of these pass around the lower jaw; an olive blotch on opercle; some brown dots behind eye; dorsal cherry red, paler posteriorly, darkest on the produced anterior rays; caudal pale, scarcely tinged with reddish; anal cherry red, the lateral stripes forming 2 spots of deeper red on the fin; pectoral plain; ventrals deep cherry red. A second specimen, smaller in size, probably the female of the species, had a different coloration, as follows: Orange brown, everywhere much mottled, the edges of many scales being brown, the brown becoming yellowish on lower parts, 5 brown cross bands darker and broader than in the other specimen, the first at nape, the last at base of caudal, ending behind in a sharply defined convex curve; two yellowish-brown bands across from eye over lower jaw; tip of lower jaw of the same color; 2 similar bands across breast before ventrals; dorsal and anal transparent, except where crossed by the bands; caudal and pectorals plain, ventrals deep brownish red. Key West. Two specimens are known, both young. The adult will probably be found to approach the Brazilian species, *Novaculichthys splendens* (Castelnau) in form and coloration, probably having the 2 dorsal spines lower and the ventrals longer than in the young. The young of *Novaculichthys splendens* has the caudal barred, while in *N. rosipes* it is plain; we have noticed no other characters by which the young of the 2 can be separated. The adult of *Novaculichthys splendens* has an inky-black lateral blotch surrounded by silvery. (*roseus*, rosy; *pes*, foot, from the red ventrals.)

Xyrichthys rosipes, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1884, 27, Key West (Coll. Jordan); JORDAN, Review Labroid Fishes, 658, 1890.

2025. NOVACULICHTHYS VENTRALIS (Bean).

Head 3⅜; depth 3½. D. IX, 12; A. III, 12; V. I, 5; P. 11; scales 2–26–8. Body compressed, of moderate height; upper profile of head not forming a very sharp edge; profile descending in a very regular curve from beginning of dorsal to tip of snout; snout comparatively short and blunt; preorbital low, its width at angle of mouth equaling length of eye; maxillary scarcely reaching vertical from front of orbit, 3½ in head. Two strong canines in front of each jaw, those of the mandible being received within the maxillary canines; both sets of canines with a lateral and backward curve; no posterior canines. Eye distant from upper profile only about ⅓ of its diameter, which is contained 1½ times in its distance from tip of snout, and 4½ times in length of head with opercular flap; a few faint rudiments of scales behind and below orbit; interorbital width equal to short diameter of eye; snout 3 in head; first 2 dorsal spines flexible, slenderer than the others, but not evidently differentiated from the rest of the fin; length of first spine almost ½ that of head; second spine slightly shorter than the first; third spine 3 in head; ninth spine slightly longer than third; first soft ray 2⅓ in head; last ray 5 in body; anal spines moderate, the third as long as third spine of dorsal; last anal ray ½ as long as head; caudal slightly rounded, 6 in body; first ventral ray produced, extending to base of fourth anal ray; pectoral as long as head without snout. Lateral line piercing 20 scales before the interruption, which occurs under tenth ray of dorsal. Color in spirits, purplish-gray; a broad streak of solferino in middle of sides, beginning near head and extending back to above middle of anal, the width of this stripe uncertain, but probably twice that of the eye; iris solferino with a narrow light circle around pupil; several narrow stripes a little darker than the body color from the eye over preorbital and cheek; a similar stripe running almost vertically on opercle; dorsal mottled with dusky; other fins pearly, except caudal, which is slightly dark, with a light margin, and anal, which shows some faint mottlings in alcohol. Another young individual 57 mm. long is probably of the same species. The first 2 dorsal spines are flexible, the others stiff; the ventral scarcely reaches the anal origin; across the top of the head and back are 9 or 10 light blotches, some of these being continued down the sides, forming about 6 distinct bands. Cozumel Island, Yucatan; 2 specimens. (Bean). Very close to *N. rosipes* and *N. splendens;* possibly the adult of the former. (*ventralis*, pertaining to the belly, from the long ventrals.)

Xyrichthys ventralis, BEAN, Bull. U. S. Fish Comm. 1888, 198, pl. 29, fig. 1, Cozumel (Coll. Dr. Bean. Type, No. 37077); JORDAN, Review Labroid Fishes, 659, 1890.

2026. NOVACULICHTHYS INFIRMUS (Bean).

Head 3½; depth 3½. D. IX, 12; A. III, 12; V. I, 5; P. 11; scales 2–27–11. Form of body similar to that of *N. ventralis,* the descent of the profile more abrupt, the species in this respect bearing more resemblance to *X. psittacus;* upper profile of head not forming a very sharp edge; snout comparatively short and blunt; the preorbital very much higher than in *N. ventralis;* the shortest distance from the angle of mouth to eye nearly twice length of eye; maxillary not reaching vertical from front of orbit, its length 4 in head; canines as in *N. ventralis;* eye distant from upper profile nearly ½ of its diameter, which is 6 in head and more than 2 in snout; interorbital width equal to length of eye; a few scales below the orbit; distance from snout to eye 2½ in head. All dorsal spines flexible, and of about equal length; third spine 3 in head; last soft ray very slightly produced, and about 2½ in head; anal spines very week, the third spine about 3½ in head; last anal ray little less than 3 in head; caudal nearly truncate, in some specimens the middle rays very slightly longer than external rays, the middle rays, from the end of the scales, 7 in length of body to base of caudal; ventral spine slender and weak, first ray reaching about to vent; ventral about 1½ in head and 5 in body; pectoral nearly as long as ventral; lateral line piercing 20 scales before the interruption, the twentieth scale being under tenth ray of dorsal; scales of breast and abdomen much smaller than any of the others; posterior angle of most of the scales acutely produced. Color in spirits, light olive gray, the dorsal and anal fins being darker except along their basal portions; axil of pectoral very dark, the dark blotch sometimes bordered behind by several bluish streaks on the scales; 3 narrow stripes extending from the eye over the preorbital and cheek; interopercle with 6 or 7 short, nearly vertical, lines of bluish; iris solferino; the dark color of the dorsal more pronounced on the spinous portion. Cozumel, Yucatan. (Bean); four specimens known. Evidently close to *Novaculichthys martinicensis,* but probably distinguished by the dusky axil and the scales on the cheeks. (*infirmus,* limp, flexible.)

Xyrichthys infirmus, BEAN, Bull. U. S. Fish Comm. 1888, 199, pl. 29, fig. 2, Cozumel (Coll. T. H. Bean. Type, No. 37076); JORDAN, Review Labroid Fishes, 660, 1890.

2027. NOVACULICHTHYS MARTINICENSIS (Cuvier & Valenciennes).

Head 3⅘; depth 3⅘. D. IX, 12; A. III, 12; scales 2–29–9. Dorsal spines similar, all soft and flexible. Ventral fins moderate, not reaching anal, not produced in a long filament; no small scales below eye; body more elongate than in *Xyrichthys psittacus*, the anterior profile of the head less steep and less trenchant. Color in spirits, reddish, the fins dark (in the male); head without evident blue lines; a blue vertical streak on each scale, as in other species; no silvery blotch, and no inky spot on body. Martinique. Here described from the original types of *martinicensis* and *vitta* in the museum at Paris. The 2 are not evidently different, although they are not in very good condition for comparison. The characters of this species are yet to be made out from fresh specimens. (*martinicensis*, from Martinique.)

The following are our notes on the types of these nominal species:

Xyrichthys martinicensis: Eight specimens, about .135 mm. long, in poor condition; Martinique. (Garnot.) Color faded; 1 specimen (male) with dark fins. Anterior profile rather less trenchant than in *X. psittacus.* Canines strong, $\frac{1}{1}$ on each side. No scales on head. Anterior dorsal spines not produced; none of the spines pungent. Head $3\frac{4}{5}$ in length; depth about the same. Scales 29.

Xyrichthys vitta: From the "Cabinet du Stadhouder;" .14 mm. long. Specimen a little deeper than the types of *X. martinicensis* (head $3\frac{2}{5}$; depth $5\frac{1}{3}$), but apparently not otherwise different. A yellowish streak along sides where the muscles join (perhaps not evident in life).

Xyrichthys martinicensis, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 49, 1839, Martinique; Jordan, Proc. U. S. Nat. Mus. 1886, 541 (note on type); Jordan, Review Labroid Fishes, 659, 1890.

Xyrichthys vitta, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 51, 1839, no locality given; Jordan, Proc. U. S. Nat. Mus. 1886, 541 (note on type).

Novacula martinicensis, Günther, Cat., iv, 171, 1862.

644. XYRICHTHYS, Cuvier.

(Razor-fishes.)

Xyrichthys, Cuvier, Mémoires du Muséum d'Hist. Nat., i, 324, 329, 1815 (*novacula*).

Novacula, Cuvier, Règne Animal, Ed. i, 265 1817 (*novacula*); *Novacula* of Bleeker and Günther, not *Novacula*, Gill, which is *Hemipteronotus* of Lacépède and Bleeker, a genus distinguished from *Iniistius*, Gill, by its scaly cheeks.

Amorphocephalus, Bowdich, Exc. Madeira, 238, 1825 (*granulatus*).

Body oblong, compressed, deepest behind the occiput, thence tapering backward. Head very short and deep, the profile almost vertical, the upper and anterior outlines compressed to a sharp edge; profile parabolic. Preorbital very deep. Eyes small, high, placed near the top of the head. Mouth small, low; 2 anterior canines in each jaw, no posterior canines. Cheek and opercles naked, or with only a few very small scales below the eye. Scales large, with membranaceous edges, about 26 in a longitudinal series; the lateral line running on the second row of large scales below the dorsal sheath; lateral line interrupted behind, commencing again lower down on the caudal peduncle. Dorsal fin continuous, with 9 pungent spines essentially alike. Colors brilliant. Tropical seas. (ξυρόν, razor; ἰχθύς, fish.)

a. Black ocellus larger than eye at base of caudal, just below lateral line; none on dorsal fin. MUNDICEPS, 2028.

aa. Black ocellus wanting, not present anywhere on body or on fins in either sex.

  b. Scales of sides of body each with a vertical blue spot. General color more or less red; side of body with a diffuse silvery area below and behind the pectoral fin, often wanting or disappearing in spirits; scales below this area with pearly vertical streaks; color rose red or brownish, with a blue vertical streak on each scale; vertical blue streaks on the head, as in other species; males (in life, always) with a dark-red cross shade behind pectorals, this disappearing in spirits; dorsal immaculate; anal with oblique violaceous streaks; caudal with 6 or 8 dark cross streaks. Head 3½ in length; depth 3⅕; eye small, 5½ in head; scales 2–26–8. PSITTACUS, 2029.

bb. Scales of sides of body without blue spots; head with but 5 vertical streaks of blue. Color red, the fins nearly plain; a red axillar band, disappearing in spirits; iris red; caudal truncate; otherwise as in *X. psittacus*, of which it is probably a color variety. MODESTUS, 2030.

2028. XYRICHTHYS MUNDICEPS, Gill.

Head 3¼; depth about 3¼, the males deeper than females. D. IX, 12; A. III, 11; scales 2–24–9. Anterior profile of head parabolic; preorbital very deep, its depth ½ the head; eye near top of head, its diameter not ½ depth of preorbital; anterior profile of the head more or less trenchant; usually a blue vertical bar on each scale. Head in male with blue vertical stripes; a black ocellus larger than eye at base of caudal, just below lateral line, none on dorsal fin; 3 concentric, blue, curved lines on flap of opercle; 3 narrow blue lines across cheek; a violet vertical line on base of each scale; lower jaw with numerous lines; fins pale, unmarked; female plain light brown, without markings on head or body. A very handsome species known from numerous specimens, the original types and others, collected by Mr. John Xantus at Cape San Lucas; not yet seen elsewhere. (*mundus*, neat; *ceps*, head.)

Xyrichthys mundiceps, GILL, Proc. Ac. Nat. Mus. Sci. Phila. 1862, 143, Cape San Lucas (Coll. Xantus); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 367; JORDAN, Review Labroid Fishes, 660, 1890.

Novacula mundiceps, GÜNTHER, Cat., IV, 172, 1862.

2029. XYRICHTHYS PSITTACUS (Linnæus).

(RAZOR-FISH.)

Head 3½; depth 3⅕. D. IX, 12; A. III, 11; scales 3–26 or 27–8; eye 5½ in head, very small and close to the profile; depth of preorbital, from eye to angle of head, 2⅒ in head; length of cheek much less than ½ its height. Body oblong, very strongly compressed; profile very steep; the jaws equal, the canines $\frac{2}{2}$; pectorals reaching past tips of ventrals; caudal rounded; a few embedded scales under eye; lateral line with the tubes simple. Color rose red or brownish, with a blue vertical streak on each scale; vertical blue streaks on the head; side of body with a diffuse silvery area below and behind the pectoral fin, often wanting or disappearing in spirits; scales below this area with pearly vertical streaks; males (in life, always) with a dark-red cross shade behind pectorals, this disappearing in spirits; dorsal immaculate; anal with oblique violaceous streaks; caudal with 6 or 8 dark cross streaks. West Indies, rather common, north to Pensacola and Charleston, south to Bahia. Length 15 inches; a handsome species, perhaps not distinct from the razor-fish (*Xyrichthys*[*] *novacula* Linnæus) of the Mediterranean. (*ψίττακος*, parrot.)

Coryphæna psittacus,[†] LINNÆUS, Syst. Nat., Ed. XII, 448, 1766, Charleston. (Coll. Dr. Garden.)
Xyrichthys psittacus, GOODE & BEAN, Proc. U. S. Nat. Mus. 1884, 45; 1885, 105 (note on type of *Coryphæna psittacus*); BEAN, Bull. U. S. Fish Comm. 1888, 202.
Coryphæna lineata, GMELIN, Syst. Nat., 1195, 1788, Charleston. (Coll. Dr. Garden.)
Xyrichthys venustus, POEY, Enumeratio, 110, 1875, Martinique; substitute for *X. lineatus*, CUVIER & VALENCIENNES, supposed to be different from X. *lineatus* of GMELIN; BEAN, Bull. U. S. Fish Comm. 1888, 200.
Xyrichthys lineatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 50, 1839; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 609; JORDAN & GILBERT, Synopsis, 605, 1883.
Novacula lineata, GÜNTHER, Cat., IV, 171, 1862.
Xyrichthys vermiculatus, POEY, Memorias, II, 215, 1860, Havana (Coll. Poey); JORDAN & GILBERT, Synopsis, 605, 1883; BEAN, Bull. Fish Comm. 1888, 202.

2030. XYRICHTHYS MODESTUS, Poey.

Head $3\frac{5}{6}$ in total with caudal; depth $4\frac{1}{7}$. D. IX, 12; A. III, 11; scales 28–30–10. Body and head very much compressed; eye high, contained 6 times in distance from the mouth to the point of the opercle, 3 in snout. No scales on head. First ray of dorsal stronger than the others; caudal truncate. Color carmine lake; brown posteriorly; opercle greenish yellow; head with 5 black vertical bands; a deep-red band in axial covering base of pectoral; fins pale, scarcely streaked; iris red. Differs from *vermiculatus* in truncate caudal, longer pectoral, fewer stripes on head, and absence of streaks on trunk; the space behind pectoral red instead of brown. Cuba. (Poey); not seen by us; evidently very close to *X. psittacus*, of which it is probably a color variation. (*modestus*, modest.)

Xyrichthys modestus, POEY, Repertorio, II, 238, 1867, Havana (Coll. Poey); POEY, Synopsis, 336, 1868; JORDAN, Review Labroid Fishes, 661, 1890.

645. INIISTIUS, Gill.

Iniistius, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 143 (*pavo*).
Xyrichthys, BLEEKER, Atlas Ichth., 149, 1862 (*pavo*); not of CUVIER.

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[*] We have compared numerous specimens from Pensacola and Charleston, with all the descriptions available of the Mediterranean species, and can find no difference whatever. We are, however, unwilling to place *X. psittacus* in the synonymy of *X. novacula* without actual comparison of specimens. These Charleston specimens seem to represent the *psittacus* of Linnæus and the *lineata* of Gmelin. The *vermiculatus* of Poey seems to be the same, as is also, in our opinion, his *venustus* (*lineatus*, Cuvier & Valenciennes). The white peritoneal blotch of *venustus* is evident on some of our specimens and not on others. If the synonymy be correct, this razor-fish would have a distribution unusually wide for a Labroid. Dr. Bean admits, provisionally, *X. psittacus* and *X. vermiculatus* as species distinct from the common American form, for which he retains the name *X. venustus*. As, however, the types of *X. psittacus* came from Charleston, they belong, probably, to the species with the pale lateral blotch, the only species yet found in that region.

[†] The following is the synonymy of *Xyrichthys novacula* (Linnæus):
Coryphæna palmaris pulchre varia, dorso acuto, ARTEDI, Genera, 15, 1738; ARTEDI, Synonymia, 29, 1738.
Coryphæna novacula, LINNÆUS, Syst. Nat., Ed. X, 262, 1758; after ARTEDI.
Xyrichthys novacula, JORDAN, Review Labroid Fishes 660, 1890.
Amorphocephalus granulatus, BOWDICH, Exc. Madeira, 238, 1825, Bona Vista.
Coryphæna lineolata, RAFINESQUE. Caratteri, 33, 1810, Palermo.
Xyrichthys cultratus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 37, pl. 391, 1839, Martigues, Montpelier, Ivica, Seide.
Novacula cultrata, GÜNTHER, Cat., IV, 169, 1862.

First 2 dorsal spines detached from the others and inserted on or close behind the occiput; scales large, about 26 in the lateral line; lateral line on the second row of large scales below the dorsal sheath. This genus contains some 5 or 6 species, chiefly of the western Pacific. They are similar in most respects to the typical species of *Xyrichthys*, differing chiefly in having the 2 anterior spines of the dorsal fin produced, separated from the others, and placed as a separate fin on the nape. (*ἰνίον*, nape; *ἱστίον*, sail, in allusion to the first dorsal fin on the nape.)

2031. INIISTIUS MUNDICORPUS, Gill.

Head $3\frac{1}{5}$; depth $2\frac{2}{3}$. D. II–VII, 12; A. III, 12; eye 6 to 7 in head, snout $2\frac{1}{5}$; first filamentous dorsal spine nearly as long as head; pectoral equals ventral, nearly 2; scales 2–28–11. Body deep, compressed, the profile very steep; the first 2 dorsal spines long and filamentous, not connected with the other spines, the longest spine about $1\frac{1}{3}$ in head and $4\frac{1}{2}$ in body; height of head equal to its length; anterior profile steep and broadly curved, canines $\frac{2}{2}$; a ring of deeply embedded scales around posterior margin of orbit, head otherwise naked; scales on nape deeply embedded; 3 broad bars of dark olive on the back and sides, these bars nearly as wide as the interspaces; most of the scales of the back and sides with a vertical light-bluish stripe; in the middle of the first dark band are 1 or 2 scales of a different color, the posterior half of each jet-black, the base light blue; dorsal with narrow dark stripes running obliquely downward and backward; anal pale; a conspicuous light horizontal stripe near the tips of rays; a narrower similar stripe near the middle of the fin; bluish clouds on opercle; vertical pale-blue stripes below eye, a faint dusky streak below eye; female paler, plain yellowish or brownish; dorsal with several oblique bars between its rays. Rocky Islands on the Pacific coast of Mexico. The original types of this species (females), and afterwards some other specimens, have been sent to the United States National Museum from Cape San Lucas. Specimens have also been taken on the west coast of Mexico by Dr. Gilbert. Length 8 inches. This very handsome species much resembles the type of the genus, *Iniistius pavo*, of the Hawaiian Islands. (*mundus*, neat; *corpus*, body.)

Iniistius mundicorpus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 145, Cape San Lucas; JORDAN Review Labroid Fishes, 662, 1890.

Novacula mundicorpus, JORDAN, Proc. U. S. Nat. Mus. 1882, 367; JORDAN, *l. c.*, 1885, 384.

Family CLXI. SCARIDÆ.

(THE PARROT FISHES.*)

Body oblong, moderately compressed, covered with large cycloid scales as in the *Labridæ*. Mouth moderate, terminal. Teeth in the jaws more or less coalescent, at least at base; lower pharyngeals much enlarged,

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*In Cuba, the name *Vieja* (Old Wife) is applied to all the dull colored parrot fishes; that of *Loro* to the green and blue forms; *Guacamaia* to those with green teeth, these being called *Perrico* in Mexico. *Loro*, *Perrico*, and *Guacamaia* are the names applied to parrots. The small species with dark lateral streaks are known as *Bullon*.

united in a concave or spoon-shaped body, their teeth broadest transversely and truncate, arranged in mosaic; dorsal continuous, its formula usually IX, 10; anal rays II, 9; 23 to 25 scales in the lateral line; vertebræ about 11 + 14 = 25. Sexes similarily colored, the coloration almost always brilliant; fin rays essentially the same throughout the group, the squamation varying little except on the head. Genera 7; species about 110; of the tropical seas, especially abundant about coral reefs. Herbivorous fishes, often of large size, not valued as food, the flesh being soft and pasty. The species in the various genera are very closely related, being distinguished chiefly by the coloration and the dentition, both series of characters being highly specialized. We begin the group with the most generalized genus, the one nearest the Labroid ancestors of the *Scaridæ*. (*Labridæ Scarina*, Günther, Cat., IV, 208 to 240.)

SPARISOMATINÆ:

a. Lower pharyngeal broader than long, flattish or basin-shaped; gill membranes broadly joined to the isthmus, not forming a fold across it; lateral line subcontinuous; scales about head few and large, those on the cheek in 1 row; lower jaw projecting; teeth whitish or rosy.
  b. Dorsal spines flexible; teeth more or less distinct, at least anteriorly.
    c. Teeth in each jaw in few series, not imbricated or quincunx; lateral teeth of each jaw coalescent in a more or less continuous cutting edge, the teeth more free anteriorly and not adnate to the dental plate. CRYPTOTOMUS, 646.
    cc. Teeth in each jaw in 3 or 4 series, all imbricated in quincunx order on the dental plate, to which they are adnate by the posterior face; cutting edge of each jaw formed by teeth. CALOTOMUS, 647.
  bb. Dorsal spines stiff, pungent; teeth of upper jaw at least more or less coalescent.
    d. Teeth of each jaw chiefly coalescent, the jaws divided by a rather indistinct median suture. SPARISOMA, 648.

SCARINÆ:

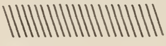
aa. Lower pharyngeal spoon-shaped, much longer than broad; teeth of jaws fully coalesced, each jaw divided by a distinct median suture; gill membranes forming a fold across the isthmus; dorsal spines flexible; lateral line interrupted behind, beginning again lower down on the peduncle of the tail; scales about head rather numerous, those on cheeks in 2 or more series; lower jaw included.
  e. Teeth and jaws whitish or rosy in color. SCARUS, 649.
  ee. Teeth and jaws blue or bluish green. PSEUDOSCARUS, 650.

646. CRYPTOTOMUS, Cope.

Calliodon, CUVIER, Règne Animal, Ed. II, Vol. 2, 266, 1829 (*spinidens*); not *Calliodon* of GRONOW, nor of BLOCH & SCHNEIDER, which is *Scarus*.
Callyodon, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 285, 1839 (*spinidens*, *ustus*, etc.).
Crypotomus, COPE, Trans. Am. Phil. Soc. 1871, 462 (*roseus*).

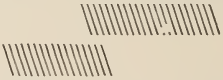
Lower pharyneals, upper pharyngeals, isthmus, and lateral line precisely as in *Sparisoma;* lateral teeth of upper jaw coalescent into a more or less continuous cutting edge, the teeth more separate anteriorly; free posterior canines often present; anterior teeth separate or coalescent at base only; lower jaw with a single series of partly coalescent teeth laterally, and 2 or more series of nearly separate teeth anteriorly; median suture of jaws not evident externally; dorsal spines flexible; jaws subequal; scales about head large, a single row on cheek, 4 or 5 on median line before dorsal. Species numerous, of small size, mostly of dull or olivaceous coloration. This genus is closely related to *Sparisoma,* differing from it in having the anterior teeth nearly separate at all ages and in having the dorsal spines flexible, as in *Scarus.* The dentition approaches that of a very young *Sparisoma.* This genus has been generally known as *Callyodon.* The genus *Calliodon* of Gronow and of Bloch & Schneider was, however, based on a species which apparently belongs to the genus *Scarus.* The name was transferred by Cuvier from the type of *Scarus croicensis* to the present group. This transfer is inadmissible in our view, and the name *Calliodon* should not be used for the genus. *Callyodon,* variant spelling of the same word, is also inadmissible. The name *Cryptotomus* was proposed by Cope for a fish having the "dentition of *Callyodon,* but with the numerous dorsal and anal spines of the group of *Harpe.*" The fin rays are given D. XI, 8; A. III, 8. The numbers in all known species of *Scarinæ* are D. IX, 10; A. III, 9 (8). We find on examination of the original type of *Cryptotomus* that Professor Cope has mistaken 2 of the (broken) soft rays of the dorsal and 1 of the anal for spines. The difference between spines and soft rays in this group is very slight. We therefore regard *Cryptotomus* as a synonym of *Callyodon* Cuvier, and the latter name being ineligible, we adopt *Cryptotomus* as the name of the genus. (*κρυπτός*, hidden; *τομός*, cutting (teeth).)

a. Posterior canines normally present (occasionally wanting on one side or both in some species).

b. Lateral teeth of lower jaw arranged in a series continuous with the anterior teeth, thus: 

c. Snout long and sharp, 2 in head, the profile somewhat unevenly convex; upper lip double only posteriorly; posterior canines 2, strong, recurved. DENTIENS, 2032.

cc. Snout shortish, its length (measured along the axis) nearly 3 in head; profile strongly convex above eye, thence nearly straight to tip of snout; posterior canine usually single, very strong. RETRACTUS, 2033.

bb. Lateral teeth of lower jaw subequal, arranged in 2 rows which are not parallel, the posterior teeth of the anterior series standing below and outside the anterior teeth of the posterior series, thus: 

d. Posterior canine usually preceded by 2 or 3 smaller ones; upper lip double for its whole length. USTUS, 2034.

dd. Posterior canine usually single, sometimes wanting; teeth otherwise much as in *C. ustus,* the anterior canines smaller; upper lip not double for its whole length. AUROPUNCTATUS, 2035.

aa. Posterior canines none; lateral teeth in each jaw subequal, those of the lower jaw larger than those of the upper and forming a continuous series.

e. Teeth of outer (anterior) series in upper jaw few, small, not canine-like, scarcely different from the lateral teeth; lower jaw without enlarged teeth; upper lip double for its entire course, the inner fold very narrow mesially, body moderately elongate, the depth $3\frac{1}{3}$ in length; head $3\frac{1}{6}$; snout rather sharp, $2\frac{3}{4}$ in head; profile gently curved, not steep; diameter of eye $4\frac{1}{2}$ in head, $1\frac{1}{2}$ in its distance from the angle of the mouth; caudal subtruncate. Color olive gray, much mottled, sides with faint longitudinal whitish stripes; head with some greenish spots; fins pale, mottled with olive. BERYLLINUS, 2036.

ee. Teeth of anterior series in upper jaw long, canine-like, directed forward, separate to their bases; lower jaw with its anterior teeth long and somewhat canine-like; scales of breast and belly considerably enlarged, 3 scales before ventrals, 5 before dorsal; body slender, elongate, little compressed, the depth 4⅓ in length; head 3⅕; eye large, about 5 in head, more than ½ snout; snout very sharp, the profile straight to above eye; caudal truncate; spines of dorsal long and very flexible. Coloration nearly plain rosy purple, with 4 dark cross shades; the back vaguely barred; caudal barred with darker, a distinct blackish axillary spot; lower fins pale, probably yellow in life. ROSEUS, 2037.

2032. CRYPTOTOMUS DENTIENS (Poey).

Head 3½; depth 3½; snout long and sharp, 2 in head, the profile somewhat unevenly convex; upper lip double only posteriorly; posterior canines 2, strong, recurved; anterior canines strong; teeth of lower jaw not very unequal, the anterior teeth a little longer than the middle ones, the posterior teeth little enlarged. Lateral teeth of lower jaw arranged in a series continuous with the anterior teeth. Fins rather high; eye 5⅓ in head. Color in alcohol, olivaceous, the fins much mottled, the sides of the body with conspicuous pale spots; in life, "greenish, the scales yellow at base, their edges bluish; vertical fins whitish, with rosy vertical spots; caudal wine color, with bluish vertical markings." Cuba; apparently rare. Here described from a specimen sent by Poey to the Museum of Comparative Zoology. (*dentiens*, developing teeth.)

Calliodon dentiens, POEY, Memorias, II, 422, 1861, Cuba (Coll. Poey); POEY, Enumeratio, 115, 1875.
Cryptotomus dentiens, JORDAN, Review Labroid Fishes, 665, 1890.

2033. CRYPTOTOMUS RETRACTUS (Poey).

Head 3½; depth 3. D. IX, 10; A. III, 9; eye 6 in head; snout 2⅓; pectoral 1⅘; highest dorsal spine 2⅘; scales 2–23–6. Profile strongly convex above eye, thence nearly straight to tip of snout; posterior canine usually single, very strong; anterior canines 2 on each side, divergent, directed forward and outward; lateral teeth of lower jaw very unequal, the posterior much larger than those near the middle of the side of the jaw, which are wholly coalescent; distance of eye from angle of mouth about twice its diameter; upper lip double for its whole length; gill rakers short and sharp, about 4 + 6; caudal truncate; pectorals reaching past tips of ventrals, which reach about midway from their base to vent. Origin of ventral spine under anterior end of pectoral base. Color in spirits, olive green, each scale with a faint brown central blotch; head nearly plain; vertical fins greenish, blotched with brown, the membranes of the first 2 spines blackish. West Indies, north to Pensacola; known to us from 2 specimens—1 from Havana, the other from Pensacola. Our identification is somewhat doubtful, as Poey says that the upper lip is double posteriorly only. (*retractus*, drawn back.)

Calliodon retractus, POEY, Synopsis, 345, 1868, Havana (Coll. Poey); POEY, Enumeratio, 116, 1875.
Cryptotomus dentiens, JORDAN, Proc. U. S. Nat. Mus. 1886, 45 and 227; not of Poey.
Cryptotomus retractus, JORDAN, Review Labroid Fishes, 665, 1890.

2034. CRYPTOTOMUS USTUS (Cuvier & Valenciennes).

Head about 3½; depth 3. D. IX, 9; A. II, 8; scales 1½–24–6. Body moderately elongated, compressed. Head rather pointed; lateral teeth of lower jaw subequal, arranged in 2 rows which are not parallel, the posterior teeth of the anterior series standing below and outside the anterior teeth of the posterior series. Posterior canine usually preceded by 2 or 3 smaller ones; upper lip double for its whole length; profile slightly convex above eye and somewhat concave before it; snout long, 2⅓ in head; distance from eye to angle of mouth 3 in head, and 2⅘ times diameter of eye; eye small, 6⅔ in head; anterior canines about 4 on each side, strong and divergent; lower teeth larger than in other species. Color in spirits, olive gray, with irregular marblings of slaty gray; 4 diffuse dark blotches along base of dorsal; dorsal olive, finely mottled with dark cross lines, the membrane of the first 2 spines black; caudal and anal plain olive. West Indies, north to Charleston, south to Bahia; rather common. We have examined specimens of this species from Rio Janeiro, Pensacola, and Charleston, as well as the original type from Brazil.* (*ustus*, scorched, from the color.)

Callyodon ustus, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 286, 1839, Brazil; Günther, Cat., iv, 214, 1862; Guichenot, Scarides, 59, 1865 (note on types); Jordan & Gilbert, Synopsis, 606, 1883; Jordan, Proc. U. S. Nat. Mus. 1886, 541 (note on type).

Cryptotomus ustus, Jordan, Proc. U. S. Nat. Mus. 1886, 228; Jordan, Review Labroid Fishes, 666, 1890.

2035. CRYPTOTOMUS AUROPUNCTATUS (Cuvier & Valenciennes).

Head 3; depth 3. D. IX, 10; A. II, 9; scales 24. Lateral teeth of lower jaw subequal. Posterior canine usually single, sometimes wanting; teeth otherwise much as in *C. ustus*, the anterior canines smaller; upper lip not double for its whole length; snout sharp, the front not steep; snout 2⅗ in head; eye 5. Color in life "greenish, with small gilt spots arranged in oblique irregular bands on the vertical fins; a yellowish line from eye to mouth, and others on side of head." San Domingo. Known only from the original types† examined by us in the museum at Paris. (*aurum*, gold; *punctatus*, dotted.)

Callyodon auropunctatus, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 290, 1839, San Domingo; Günther, Cat., iv, 214, 1862; Guichenot, Scarides, 60, 1865 (note on type); Jordan, Proc. U. S. Nat. Mus. 1886, 542 (note on type).

Cryptotomus auropunctatus, Jordan, Proc. U. S. Nat. Mus. 1886, 228; Jordan, Review Labroid Fishes, 666, 1890.

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* We have the following note on the type of *Callyodon ustus:* "A dried skin somewhat distorted; 0.23^{m} long. Brazil. (Delalande.) Color all faded. Lower lateral teeth very regularly arranged; some teeth not dissimilar outside of these in front. Lower teeth growing rather stronger backward. Upper lateral teeth very fine and even, close set. One canine near middle of jaw turned outward and backward. No other canines evident on left side; right side broken."

† We have the following notes on the types of *Callyodon auropunctatus:* "In fair condition; 0.17^{m} long; from San Domingo. (Ricord.) Body rather elongate; the snout sharp, the front not steep. Eye 5 in head; snout 2⅗; head 3; depth 3. Teeth on edge of each jaw regular, those of lower jaw twice as large, the front series standing outside of the lateral series. Upper jaw with 1 strong canine hooked outward and backward, a little behind the middle of its side. Anterior canines small, those of the lower jaws scarcely unlike the ordinary teeth. Upper lip not double for its whole length. The other specimen, 0.13^{m} long, also from San Domingo, mentioned by Cuvier, lacks the posterior canine, but seems to be otherwise similar.

2036. CRYPTOTOMUS BERYLLINUS, Jordan and Swain.

Head 3⅙ (3⅚ with caudal); depth 3⅓ (4⅕); eye 4½ in head; snout 2¾. D. IX, 10; A. II, 9; scales 2½–24–6. Body more elongate than in related species, compressed. Jaws pale, the median suture not evident; central portion of each tooth with a reddish-brown spot. Upper jaw laterally with a continuous cutting edge of coalesced teeth, this edge even along the middle of the jaw and somewhat serrate posteriorly; anteriorly the cutting edge gives place to about 2 series of lanceolate, rather obtuse, compressed teeth, which coalesce at base only; no posterior canines in any of the many specimens examined; lower jaw laterally with a series of compressed teeth, coalescent for a short distance and close set; in front are 2 or 3 series similar to those in the upper jaw. Jaws subequal, the lower very slightly included; upper lip double for almost its entire length, its inner fold narrow mesially, the lip covering most of the upper jaw. Isthmus moderate, the gill membranes not forming a fold across it. Snout rather acute; cheek with a single row of about 5 scales; 4 or 5 scales on the median line before dorsal. Lateral line subcontinuous, its tubes each with 4 branches, which cover most of the scale. Dorsal spines very slender, not pungent; caudal fin slightly rounded, its outer rays 1⅛ in head; pectorals reaching past tips of ventrals, which reach midway between their base and front of anal; origin of ventral spine directly under anterior end of pectoral base. Lower pharyngeals formed exactly as in *Sparisoma*, not quite twice as broad as long, the surface slightly concave. Color in life, olive green or olive gray, mottled above with darker and small whitish blotches; some whitish blotches above lateral line; some along lateral line, a row of 5 or 6, smaller than pupil, in a straight line below lateral line; 5 or 6 faint greenish blotch-like areas along sides; 2 or 3 narrow, parallel whitish stripes more or less distinct along lower parts of side bordered with brownish, the upper running from below eye straight to middle of caudal, the lower passing just below pectoral; some whitish bands radiating from eye; usually some dark-green spots before and behind eye; top of head vermiculated and dotted with black; a brown band across chin; dorsal pale, mottled with olive; a dusky blotch on front of dorsal; caudal greenish, edged with brown, its outer rays barred with brown and light olive, speckled and barred with brown; ventrals pale, faintly barred with brown; pectorals pale; ventral fins in adult edged with light brownish red. The whitish lines of sides become fainter with age. In spirits the brown coloration gives place to grayish or greenish, each scale often with a greenish blotch. Length 6 inches. Florida Keys; occasionally north to New Jersey, south to Rio Janeiro; common about Key West on muddy bottoms. A single specimen secured in the market at Havana, 5¼ inches in length, where Poey seems not to have noticed the species. A specimen from Rio Janeiro has the anterior profile steeper and the eye smaller, 5½ in head. We have examined the young specimen described and figured by Dr. Bean as "*Sparisoma sp.*" from Somers Point, New Jersey. It is identical with young specimens of *Cryptotomus beryllinus* from Key West. The occurrence of this tropical fish at a point so far to the northward is surprising. (*beryllinus*, color of beryl or emerald.)

Cryptotomus beryllinus, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 101, Havana; Key West (Types, Nos. 35097 and 35162. Coll. D. S. Jordan): JORDAN, *l. c.*, 137; JORDAN, Proc. U. S. Nat. Mus. 1886, 45: JORDAN, 1886, 228; JORDAN, Review Labroid Fishes, 666, 1890.

Sparisoma sp., BEAN, Bull. U. S. Fish Comm. 1888, 137, Somers Point, New Jersey; young specimen.

2037. CRYPTOTOMUS ROSEUS, Cope.

Head 3⅕; depth 4⅕. D. IX, 9; A. III, 9; eye 5 in head; snout 3¾; scales 1½–25–6. Lateral teeth in each jaw subequal, those of the lower jaw larger than those of the upper and forming a continuous series. Teeth of anterior series in upper jaw long, canine-like, directed forward, separate to their bases; lower jaw with its anterior teeth long and somewhat canine-like; upper lip double* for all its length; scales of breast and belly considerably enlarged, 3 scales before ventrals, 5 before dorsal; body slender, elongate, little compressed; eye large, more than ½ snout; snout very sharp, the profile straight to above eye. Caudal truncate; spines of dorsal long and very flexible; pectorals reaching past tips of ventrals; origin of ventral spine under middle of pectoral base. Coloration nearly plain ("rosy purple" according to Cope), with 4 dark cross shades; the back vaguely barred; caudal barred with darker, a distinct blackish axillary spot; lower fins pale, probably yellow in life. West Indies, south to Brazil; apparently rare. Of this species we have examined the original type in the museum of the Academy of Natural Sciences at Philadelphia, and 3 smaller specimens taken by the *Albatross* at Bahia. It is the most slender of all the *Scaridæ*. (*roseus*, rosy.)

Cryptotomus roseus, COPE, Trans. Am. Phil. Soc., XIII, 1869, 462, St. Martins (Coll. Dr. Van Rijgersma): JORDAN, Proc. U. S. Nat. Mus. 1885, 545 (note on type); JORDAN, Proc. U. S. Nat. Mus. 1886, 228; JORDAN, Review Labroid Fishes, 666, 1890.

647. CALOTOMUS, Gilbert.

Calotomus, GILBERT, Proc. U. S. Nat. Mus. 1890, 70 (*xenodon*).

Teeth distinct, equal, imbricated in regular oblique rows in both jaws, wholly concealing the dental plates to the anterior edge of which they are affixed. Cutting edge of each jaw formed by the outer teeth, the dental plate not reaching the edge, and visible only from within. Lips double for a short distance only. Scales of cheek in 1 row; lateral line continuous; bases of dorsal and anal with scaly sheaths; dorsal spines 9, soft and flexible; gill membranes broadly joined to the isthmus. This genus is based on a large Scaroid of the eastern Pacific, allied to *Cryptotomus*, but differing in the arrangement of the teeth. Some of the East Indian species referred by Bleeker to *Calliodon* may belong to *Calotomus*. (*καλός*, beautiful; *τομός*, cutting.)

2038. CALOTOMUS XENODON, Gilbert.

Head 3⅓; depth 2⅗. D. IX, 10; A. III. 9; scales 1½–25–7. Body deep, compressed, snout short and convex, 2⅗ in head; interorbital width 4;

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* In our specimens; double on sides only according to Cope.

maxillary 3¼; eye 2⅓ in snout. Teeth pointed, imbricated in quincunx order, both tips and edges wholly free, the anterior face convex, the posterior face alone adnate to the dental plate; of equal size and similar in both jaws, there being 3 or 4 teeth in an oblique cross series anteriorly, about 12 of these series in the upper jaw, and 14 in the lower; 2 teeth in the upper jaw at the angle of the mouth are conical and curved downward and backward. Scales on cheek in a single series, 3 or 4 in number; 4 scales on median line before the dorsal fin, the anterior one encroaching on occiput; scales on breast not reduced, 3 on median line before ventrals, 1½ series of scales between lateral line and dorsal, the ½ series forming a sheath along base of fin. Dorsal spines rather high and flexible, the origin of the fin over base of pectorals; caudal deeply lunate, the outer rays produced, ⅓ longer than the middle rays, 1¼ in head; none of the ventral rays elongate, the fin reaching about halfway to vent, 1⅘ in head; pectorals with wide oblique base, the free margin of fin somewhat *f*-shaped, the upper angle acute, the lower rounded, the longest ray 1⅓ in head; origin of ventral spine under middle of pectoral base. Color mottled silvery, slaty, and brown, without definite pattern; top of head and snout dusky; pectorals black at base; ventrals dusky at tip; dorsal and anal black on basal half, mottled distally; caudal mottled, narrowly edged behind with white. Two specimens from Socorro Island, the longest 14 inches long. (Gilbert.) (ξένος, strange; ὀδούς, tooth.)

Calotomus xenodon, GILBERT, Proc. U. S. Nat. Mus. 1890, 70, Socorro Island (Coll. *Albatross*); JORDAN, Review Labroid Fishes, 667, 1890.

648. SPARISOMA, Swainson.

(VIEJAS.)

Sparisoma, SWAINSON, Nat. Hist. Class. Fishes, etc., II, 227, 1839 (*abildgaardi*).
Scarus, BLEEKER, Versl. Akad. Wet. Amsterdam, XII, Scaroid, 3, 1861 (*cretensis;* not of Forskål).
Euscarus, JORDAN & EVERMANN, Check-List, 416, 1896 (*cretensis*).

Lower pharyngeal broader than long, subhexagonal, its surface moderately concave or flattish; teeth in each jaw largely coalescent in adult, their tips more or less separate in the young, the edge, especially of the lower jaw, remaining uneven; the median suture in each jaw present, but not well defined; 1 to 4 radiating canines sometimes present on each side of upper jaw above its cutting edge;* gill membranes broadly united to the isthmus; dorsal spines pungent; upper lip double for its entire length; lower jaw projecting beyond upper; lateral line not interrupted, passing gradually from its row of scales posteriorly to the series next below it; tubes of lateral line much branched; scales about head large, those on cheek in a single row, those on the median line in front of dorsal 3 or 4 in number. Species of rather small size, most of them American; some of them showily colored. *Sparisoma cretensis* (Linnæus) the *Scarus* (σκάρος) of the ancients is the only member of this family found in Europe. It is an ally of *Sparisoma flavescens.* We begin the group with the smallest and most generalized forms, those whose dentition approaches nearest to *Cryptotomus* and its Labroid ancestors. (*σπάρος,* Sparus, ancient name of some Sparoid fish; *σῶμα,* body. Sparus is said to be from *σπαίρω,* I gasp.)

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*In some species having normally 1 or more canine teeth, some or all of them are occasionally absent, on one or both sides.

SPARISOMA:

a. Upper jaw with one or more canines above its cutting edge (these occasionally obsolete on one or both sides); coloration often brilliant.

  b. Caudal truncate or slightly rounded, the angles not acute.

    c. Posterior canines 2 to 4 on each side.

      d. Caudal fin with more or less of black on posterior margin, yellowish at base; anal light bluish and reddish, its tip dusky; canines strong, 4 (rarely 3) on each side; 4 or 5 scales on cheek. Color olive green above, mottled and speckled with red; snout with blue lines; a blue band around lower jaw; axil and base of pectoral deep blue-black; fins mostly light orange and yellow. XYSTRODON, 2039.

      dd. Caudal fin without black in the adult; 1 or 2 more or less distinct whitish bars across the chin.

        e. Canines 3 or 4 on each side, radiating horizontally; axil with little or no blue, but with a dusky blotch partly hidden by the fin; front steeper and less curved than in *hoplomystax;* body and fins mottled, but much less so than in *hoplomystax.*

          f. Canines 3 on each side; pores of lateral line with but 2 branches; sides of head much dotted with black; caudal barred. ATOMARIUM, 2040.

          ff. Canines 4 on each side; tubes of lateral line much branched; a distinct narrow streak of blue downward and forward from eye; caudal nearly plain, dusky olive; anal mottled. RADIANS, 2041.

        ee. Canines 2 or 3 on each side; axillary region extensively deep blue in life, this forming a large blotch around and on base of pectoral; a curved series of small white specks around the blue on base of pectoral; body deep and robust; fins all mottled, the anal with 3 darker areas; body with 3 faint pale lengthwise streaks, more or less obscure; 2 of these bound a more or less interrupted dusky band from eye to base of caudal. HOPLOMYSTAX, 2042.

    cc. Posterior canine single on each side; body rather stout. Color grayish olive, closely speckled with whitish and dusky; lower half of body abruptly paler from level of eye; upper half with a narrow whitish stripe confluent with the back from nape to end of dorsal; the part of back below this crossed by irregular dusky bars which end abruptly at level of eye; lower half with obscure pale lengthwise streaks; a black spot as large as pupil on end of opercle; axil and base of pectoral dark; dorsal gray, throughout mottled with pale and vaguely barred and spotted with blackish; caudal dark olive, with narrow pale cross bars; a broad olive cross bar at base; anal colored like soft dorsal; ventral faintly barred; pectoral plain; chin with 2 broad silvery cross bars, and 2 irregular bars of dark olive. NIPHOBLES, 2043.

  bb. Caudal fin simply lunate, the outer rays more or less exserted, but not twice as long as the inner rays and much shorter than the head; canine single on each side (rarely obsolete or duplicated).

    g. Head with a scarlet stripe from below eye to angle of mouth; a small scarlet streak behind eye; color chiefly purplish brown; a round spot of yellow and black behind head, just below lateral line; fins chiefly red; angles of caudal black; axillary spot obscure. AUROFRENATUM, 2044.

gg. Head without scarlet stripe.

h. Pectoral very long and sharp, 5 in body; body brownish, not striped; no axillary spot. OXYBRACHIUM, 2045.

hh. Pectoral moderate, less than ⅕ length.

i. Color dark reddish brown, with white mottlings; no yellow or black spot; belly abruptly red; fins mostly cherry red; axillary spot obsolete; body rather deep; scales large, their outlines well defined. ABILDGAARDI, 2046.

ii. Color brownish, with 3 or 4 pale longitudinal streaks, the upper running to a faint pale blotch on back of tail between 2 dark-brown blotches; caudal distinctly pale edged behind and more distinctly barred than in *S. flavescens;* spot at base of pectoral brownish and very faint; about 4 small dusky blotches along base of dorsal, the last one most distinct at base of last ray; caudal with many cross bars and blotches; snout dusky; chin with 1 or 2 whitish cross bars; caudal concave, with sharp angles; dorsal and anal mottled with brown; pectorals and ventrals plain; young with dark opercular blotch and dark points about eye. DISTINCTUM, 2047.

bbb. Caudal fin in adult deeply forked, the upper lobe about as long as the head, and twice or more the length of the inner rays; caudal fin variegated.

j. Canines 3 or 4 on each side; pores of lateral line excessively branched, each with several (6 to 8) much divided branches. Color bright greenish blue (the sides sometimes with a blue band); caudal lobes blue, the middle rays red; dorsal and anal red; pectorals yellowish, the axillary spot large, black, edged with red. CHRYSOPTERUM, 2048.

jj. Canines 1 or 2 on each side; upper and lower caudal lobes greenish.

k. Opercles without black and yellow spot, pores of lateral line each with a few (4 or 5) nearly simple branches. Color in life chiefly light blue, without sharp markings, fading to reddish in spirits; caudal dull greenish, the middle rays reddish; other fins mostly scarlet; axillary spot well defined. LORITO, 2049.

kk. Opercle with an inky-black spot, in front of which is a golden spot; 1 short blunt canine; no spot at base of pectoral; axil dark within; a white blotch near root of caudal; gill membranes red; pectorals dark green posteriorly; anal green at base and margin, brownish in the middle; caudal with a red crescent, separated by a green band from the transparent posterior margin. VIRIDE, 2050.

EUSCARUS (εὖ, true; σκάρος, scarus):

aa. Upper jaw never with posterior lateral canines; colors dull, usually mottled brown or greenish.

l. Caudal slightly rounded, the angles not produced.

m. Scales of lateral line, and some on nape and opercles black; dorsal spines stout; olive, the vertical fins edged with violet; axil violet. STRIGATUM, 2051.

ll. Caudal lunate, or truncate with sharp angles (rounded in the very young).

n. Caudal fin distinctly barred with irregular brown spots and markings.

o. Body without distinct pale longitudinal streaks above; caudal not evidently pale edged; spot on base of pectoral blackish and distinct; no evident pale or dark blotches on back of tail.

p. Caudal lunate or subtruncate in adult, rounded in young. General color olivaceous or reddish brown, clouded, and washed with cherry red; lower fins mostly red; pectorals light orange; chin pale, with a whitish cross band. FLAVESCENS, 2052.

pp. Caudal truncate, not at all lunate in the adult, the angles very slightly produced.

q. Color olivaceous or bluish green, a whitish streak below mouth; a dark axillary spot usually present; a whitish band on caudal; fins dotted. RUBRIPINNE, 2053.

nn. Caudal fin not crossbarred.

r. Axillary spot black, very distinct; outer rays of caudal considerably produced, the length of exserted part $\frac{1}{3}$ to $\frac{1}{2}$ that of head.

s. Caudal red, its outer rays green; axillary spot very distinct; body olivaceous, nearly plain, reddish below; some greenish blue on head; a faint greenish streak running backward from the angle of the mouth. BRACHIALE, 2054.

ss. Caudal violaceous, its outer rays $\frac{1}{2}$ head; a dark spot at base of pectoral; color dusky red, scales of back and sides with red spots. MASCHALESPILOS, 2055.

rr. Axillary spot faint or wanting; coloration uniform dark purplish violet; 3 large scales on cheek; dorsal spines rather slender, but pungent; caudal emarginate; tubes of each scale of lateral line much ramified and extending over the whole scale; teeth of moderate size, very distinct on the edges of the jaws. FRONDOSUM, 2056.

Subgenus SPARISOMA.

2039. **SPARISOMA XYSTRODON,** Jordan & Swain.

Head 3 ($3\frac{5}{7}$ with caudal); depth $2\frac{8}{9}$ ($3\frac{3}{5}$). D. IX, 10; A. II, 9; scales $2\frac{1}{2}$–24–6. Body oblong. Jaws pale; upper jaw with 3 or 4 exserted canines on each side above the cutting edge, the largest in front of the angle of the mouth, curved outward and somewhat backward, the others farther forward, 1 of them being near the median suture; upper lips covering most of upper jaw. Eye moderate, $4\frac{1}{2}$ in head; snout bluntish, $2\frac{4}{5}$; cheek with 1 row of 4 or 5 scales; pores of lateral line each with 3 to 6 branches, covering most of the scale; 4 scales before dorsal; pectoral broad, its upper angle broadly rounded, not reaching much past tips of ventrals. Caudal fin slightly convex when spread open, its outer rays scarcely as long as middle ones, $1\frac{1}{3}$ in head. Color in life, bright olive green above, paler below, the upper parts very much mottled, speckled with white and marbled with coppery red on various scales; head similarly green, dotted with whitish above, a narrow ring of bright blue above eye, interrupted above, a blue stripe from it straight to angle of mouth; blue and coppery markings on opercle; lower part of head light yellow; a blue band around lower jaw; axil and a spot at base of pectoral in front above deep blue black; dorsal orange flesh color, its tip paler; caudal yellow at base, paler beyond, its posterior portion more or less jet-black, the fin with a few whitish dots toward the base; anal light bluish and reddish, its tip dusky; ventrals pale; pectorals light yellowish; lining of opercle blackish. Other specimens having the same markings were pearly bluish rather than green above, livid below; the blue on head paler, the red of a light yellowish carmine. Some highly colored specimens are greener, with belly bright yellow, brightest at throat; anal and caudal chiefly jet-black. In spirits this species is dark olive green above, paler below; caudal and anal very broadly margined with black; black bar across base of pectoral very distinct. The amount of black on caudal and anal seems to depend on age, the very young showing scarcely any. West Indies, north to Key West, generally common, but confused with other species. This species is found in eelgrass and *Fucus* about Key West, in company with *S. hoplomystax*, and is equally abundant with the latter. It reaches a still smaller size, none of the many specimens obtained exceeding 5 inches in length. These are sexually mature. One or 2 specimens of this species were seen in the market at Havana, and many specimens were obtained by the *Albatross* at St. Lucia. Dr. Bean found the species at Cozumel. (*ξύστρον*, a scraper; *ὀδούς*, tooth.)

Sparisoma xystrodon, Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 99, Key West; Havana (Type, No. 35174. Coll. Jordan & Dye); Jordan, Proc. U. S. Nat. Mus. 1884, 137; Bean, Bull. U. S. Fish Comm. 1888, 198; Jordan, Review Labroid Fishes, 678, 1890.

2040. SPARISOMA ATOMARIUM (Poey).

Profile regular, the form elegant; depth $3\frac{1}{5}$ in total length; eye $4\frac{1}{4}$ in head; 3 posterior canines; scales of lateral line with but 2 small branches diverging at base; caudal truncate. Color carmine red in life, paler below, with pale streaks along the rows of scales; anal orange; branching pores below orbit; sides of head much dotted with black; caudal with pale vertical bands; soft rays of dorsal and anal dotted; membrane of first 2 dorsal spines dusky; anal bluish. Length 120 mm. Cuba (Poey); not seen by us. (*atomarius*, marked with atoms or dots.)

Scarus atomarius, Poey, Memorias, II, 423, 1861, Havana; Poey, Synopsis, 343, 1868.

2041. SPARISOMA RADIANS (Cuvier & Valenciennes).

Head $3\frac{1}{2}$; depth 3. D. IX, 9; A. II, 9; eye 4 in head; snout 3; scales $1\frac{1}{2}$–26–6. Body oblong, compressed; anterior profile evenly convex; front steeper and less curved than in *S. hoplomystax;* posterior canines 4 on each side, radiating horizontally, the anterior canines pointing forward, the lateral curved back, those near the angle of the mouth the largest; 4 scales before dorsal in a median line; about 5 scales in the row on cheek; scales of lateral line with tubes much branched; pectoral reaching slightly past the tips of the ventrals; caudal truncate or slightly rounded, the angles not acute. Body and fins mottled, but much less so than in the preceding; reddish brown; axil with little or no blue, but with a dusky blotch partly hidden by the fin; a distinct narrow streak of blue downward and forward from eye; caudal nearly plain, dusky olive; anal mottled; 1 or 2 more or less distinct whitish bars across chin. West Indies, south to Brazil, not rare, but often confounded with other species. Here described from 3 specimens taken by the *Albatross* at Bahia, the original locality of *S. radians*. These agree so well with *S. lacrimosum* of Poey that we regard the latter species as identical.

A specimen sent by Poey to the Museum of Comparative Zoology, shows the following characters: Color in spirits, mottled brown, the caudal similarly mottled and faintly barred; no dark axillary spot; head plain;

dorsal mottled. Caudal short, truncate; tubes of lateral line little branched; body rather elongate, the depth 3½ in length; pectoral short; 2 strong posterior canines, before which are several smaller pointed teeth. Another specimen has 4 pointed teeth on each side of upper jaw. These probably belong to *Sparisoma radians*. (*radians*, radiating.)

Scarus radians, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 206, 1839, Brazil; GUICHENOT, Scarides, 17, 1865; note on types.
Sparisoma radians, JORDAN, Review Labroid Fishes, 677, 1890.
Scarus lacrimosus,* POEY, Memorias, II, 422, 1861, Havana; POEY, Synopsis. 343, 1868.

2042. SPARISOMA HOPLOMYSTAX (Cope).

Head 3⅕ (3$\frac{9}{10}$ with caudal); depth 2¾ (3⅕); eye moderate, 4½ in head; snout rather obtuse, 3. D. IX, 10; A. II, 9; scales 2½–24–6. Body oblong; a single stout canine directed outward and usually slightly backward on each side of upper jaw, in front of angle of mouth; a second canine often present in front of this; a small canine directed downward on each side of front of upper jaw above the cutting edge and close to the median suture; upper lip covering most of the upper jaw. Cheek with 1 row of large scales; pores of lateral line each with 4 to 6 branches, which cover nearly the whole of the scale; 4 scales on median line before dorsal Pectoral broad and fan-shaped behind, not reaching greatly past ventral; caudal slightly convex when spread open, the outer rays scarcely as long as the median ones, 1½ in head. Lower pharyngeal nearly twice as broad as long, its upper surface almost flat, less concave than in related species. Color in life, upper half of body olive green, the color very much mottled and speckled, marbled with whitish and streaked with green; lower parts fleshy red, equally and similarly mottled; top and front of head most extensively mottled; sides of head similarly mottled; lower jaws usually more or less brown, with 2 whitish bands, the anterior continuous, the posterior of 4 separate whitish blotches; edge of opercle bright greenish blue; axil extensively deep blue, with some reddish spots; a deep-blue blotch on base of pectoral; dorsal colored like the back; caudal greenish at base, with a pale-yellowish band and some small whitish dots, its edge blackish, the fin elsewhere translucent; anal dull gray with orange, mottled with brown; ventrals pale flesh color; the yellow and orange of fins and red of belly become grayish in spirits; the blue of the axil becomes dark green in spirits, but does not disappear. Length of type 5½ inches. West Indies, from Key West to Bahia, generally common. Here described from the type of *Sparisoma cyanolene* from Key West. This little fish is very abundant about Key West, where many specimens were taken with the seine in the kelp. None of these was more than 6 inches in length, and as they were sexually mature at that size it is not likely that they grow much larger. The prevalence of blue around the base of the pectoral is a striking color mark which does not soon disappear in alcohol. Specimens were also obtained by the *Albatross* at St. Lucia and

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**Sparisoma lacrimosum*, according to Poey, is notable chiefly for the 4 posterior canines, the last turned backward. Caudal truncate. Color rose. a blue band from orbit to commissure, fading in spirits; fins brown rose, faintly marbled; pectoral plain, with no axillary spot; scales of lateral line with 1 tube, from which spring 4 much ramified branches.

at Bahia, and by Dr. Bean at Cozumel. (*ὅπλον*, weapon; *μύσταξ*, upper jaw.)

Labrus radians, CASTELNAU, Anim. Nouv., etc., Amérique du Sud, 29, 1855; not *Scarus radians*, CUVIER & VALENCIENNES.

Scarus radians, GÜNTHER, Cat., IV, 211; JORDAN & GILBERT, Synopsis, 906, 1883; not of CUVIER & VALENCIENNES.

Scarus hoplomystax, COPE, Trans. Am. Philo. Soc. 1869, 462, St. Martins. (Coll. Dr. J. Van Rijgersma.)

Sparisoma cyanolene, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 98, Key West (Coll. Jordan & Dye); BEAN, Bull. U. S. Fish Comm. 1888, 198.

Sparisoma hoplomystax, JORDAN, Review Labroid Fishes, 677, pl. 10, 1890.

2043. SPARISOMA NIPHOBLES, Jordan & Bollman.

Head 3⅖ (4 with caudal); depth 3⅔ (4⅕); eye moderate, 4½ in head; snout obtuse, 2⅘. D. IX, 10; A. 11; scales 2–24–6. Body oblong. A small canine directed downward on each side in front of upper jaw above cutting edge and close to the median suture; another single stout canine directed outward and backward on each side of the upper jaw in front of angle of mouth; upper lip covering most of upper jaw; cheeks with 1 row of 5 large scales; tubes of lateral line each with 3 to 5 branches, usually 3; 4 scales on median line before dorsal. Caudal truncate, the outer rays not produced, 1⅖ in head. Color in spirits, brownish olive, the color so mottled and speckled with whitish as almost to hide the ground color; head much speckled with bluish and black; dark spots smaller and more defined on top of head; brownish regions most prominent around eyes and lower part of cheeks; chin crossed by a silvery band, behind which is a brownish band, and then a row of six silvery spots, of which the lowermost are largest; an ill-defined whitish band from lower margin of eye across opercle connecting with one above base of pectorals; scales on body marked like those on head; jaws pale; black spots more prominent above lateral line, the white below pectorals; above 5 bluish-white stripes following rows of scales, the one above lateral line most prominent, the one under lateral line not distinct; between the band above lateral line and the one above base of pectorals are 5 slightly oblique dusky blotches, of which the third (from the head) is least distinct; the last 4 extend on dorsal fin; region around caudal fin brownish, the spots less distinct; a small black humeral spot; 2 scales in front of dorsal dark; axil rather dark; dorsal with 4 distinct darker mottled areas, the first between fifth and seventh spines, the second between last spine and third ray, the third at base of fifth and sixth rays, and the last at eighth and ninth rays; upper part of soft dorsal with 2 or 3 rows of brownish spots; caudal brownish with 4 or 5 narrow, wavy, white vertical bars, of which the last 2 are most prominent; anal with 3 darker areas, its markings similar to those on dorsal; pectoral yellowish, spotted at base and near tips of rays; ventrals faintly brownish and indistinctly spotted with white. Known from a single specimen 5½ inches in length, taken by Dr. Charles L. Edwards at Green Turtle Cay, in the Bahamas. (*νιφωβλής*, snowed upon, from the white spots.)

Sparisoma niphobles, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1888, 551, Green Turtle Cay, Bahamas (Coll. C. L. Edwards); JORDAN, Review Labroid Fishes, 677, 1890.

2044. SPARISOMA AUROFRENATUM (Cuvier & Valenciennes).

Head $3\frac{1}{4}$ (4 with caudal); depth $2\frac{3}{4}$ ($3\frac{1}{2}$). D. IX, 10; A. II, 9; scales $2\frac{1}{2}$–24–6. Body elliptical-oblong; eye rather large, $4\frac{2}{3}$ in head; snout not blunt, $1\frac{5}{7}$ in head; cheek with a single row of 4 or 5 large scales; 4 scales on median line before dorsal; 3 before ventrals; pores of lateral line much branched, covering most of the scales. Pectoral reaching well past tips of ventrals; caudal fin moderately lunate, the upper lobe the longer, $1\frac{2}{7}$ in head, $1\frac{1}{3}$ times length of middle rays. Teeth less distinct than usual in this type, the edge of the upper jaw nearly entire, the edge of the lower jaw more uneven. A small canine in front of the angle of the mouth on each side (this obsolete on both sides of 1 of the 3 specimens examined). A small canine near suture of upper jaw on both sides usually present; upper lip covering more than $\frac{1}{2}$ of upper jaw. Color in life, purplish brown, becoming reddish on sides, and finally livid greenish below; head purplish-violet about eyes; sides of head with a stripe of vivid scarlet running from corner of mouth just below and slightly past eye, a second short streak of the same color above the first behind the eye; jaws pale in color; a golden-orange spot rather smaller than eye on and below the fifth scale of the lateral line, its upper portion black; dorsal orange, slaty at base posteriorly; caudal scarlet at base, then blood red, yellowish in the center, whitish behind, the projecting tips of both lobes black, the whole fin faintly mottled and barred with dusky; anal crimson, its edge light blue; ventrals livid purplish; pectorals light yellowish, bluish in axil, dusky at base in front. In spirits the orange and red colors fade to light yellowish; a more or less distinct dark stripe on each row of scales below the lateral line, paler on lower rows; pale greenish about eyes; dusky on snout above; edge of scales on body above, and on sides more or less dusky. Length of example described from Havana, $8\frac{1}{2}$ inches. West Indies; rather common at Havana. Others examined are from Cuba, Sombrero, St. Thomas, and St. Lucia. In color it is one of the most strongly marked and handsomest species. (*aurum*, gold; *frænatus*, bridled; in allusion to the scarlet band backward from the mouth, which is vermilion rather than golden, for which reason Poey has substituted the name *miniofrenatus*.)

Scarus aurofrenatus, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 191, 1839, San Domingo (Coll. Ricord); Günther, Cat., iv, 212; Guichenot, Scarides, Mus. Paris, 13, 1865; Cope, Trans. Am. Philos. Soc. 1871, 461.

Scarus miniofrenatus, Poey, Memorias, ii, 279, 393, 1860, Cuba.

Sparisoma aurofrenatum, Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 96; Jordan, Proc. U. S. Nat. Mus. 1886, 47; Jordan, Review Labroid Fishes, 675, 1890.

2045. SPARISOMA OXYBRACHIUM (Poey).

Head nearly 4; depth $3\frac{1}{2}$; eye $4\frac{1}{2}$ in head, $1\frac{3}{4}$ in snout, 1 in distance to mouth. A small posterior canine on the right side; lower jaw roughest; line of belly less curved than in *S. distinctum;* scales of lateral line with 3 branches. Caudal truncate; pectoral sharp-pointed and very long, 5 in total (6 in *S. distinctum*). Color brownish, without longitudinal streaks, base of scales darker; lower parts yellowish, reddish in life; fins yellowish or reddish, not spotted; no dark axillary spot; pectoral with white points at base. Length 210 mm. Cuba. (Poey); probably not distinct from *Sparisoma abildgaardi*. (*ὀξὺς*, sharp; *βραχίων*, arm.)

Scarus oxybrachius, POEY, Synopsis, 342, 1868, Havana.

2046. SPARISOMA ABILDGAARDI (Bloch).

(RED PARROT-FISH; ROSE-BACK PARROT.)

Head $3\frac{1}{5}$ ($3\frac{7}{8}$ with caudal); depth $2\frac{7}{8}$ ($3\frac{1}{2}$). D. IX, 10; A. II, 9; scales $2\frac{1}{2}$–24–6. Body rather deep; a small, bluntish canine on each side of upper jaw in front of angle of mouth; upper lip covering most of upper jaw. Head rather short; eye rather large, $4\frac{1}{2}$ in head; snout rather acute, $2\frac{7}{8}$; cheeks with a single row of large scales; each pore of lateral line with 5 to 8 branches covering most of the scale; 4 scales on median line before dorsal. Pectorals rather longer and sharper than in related species, not reaching far past tips of ventrals; caudal fin lunate; the middle a little convex when spread open, the outer rays slightly produced, the upper rays $1\frac{1}{2}$ in head in the largest specimens examined. Color in spirits, almost plain dark brown, somewhat mottled with paler; a few dark dots on opercle, the edge of the opercle being more or less blackish; pale gray below, from tip of lower jaw to caudal; teeth pale, tinged with reddish; jaws pale; all the fins pale, the dorsal narrowly edged with dusky, the fin somewhat mottled with darker; axil of pectoral pale, the base dusky above. In life, the dorsal, caudal, lower fins, and belly are bright cherry red; rest of body brown, tinged with red; pale dots and mottlings on sides of head and on body. West Indies south to Brazil; generally common. Here described from Havana specimens, 8 inches long. (Named for Abildgaard, professor in the University of Copenhagen, author of descriptions of worms.)

Vieja, PARRA, Descr. Dif. Piezas Hist. Nat., 58, pl. 28, fig. 2, 1787, Cuba.

Scarus abildgaardi, BLOCH, Ichthyol., pl. 259, 1791, America; from a specimen sent by Prof. Abildgaard.

Scarus coccineus, BLOCH & SCHNEIDER, Syst. Ichthyol., 289, 1801, Cuba; after PARRA.

Scarus aureoruber, LACÉPÈDE, Hist. Nat. Poiss., IV, 55, 163, 1803, Martinique; on a drawing by PLUMIER.

Scarus amplus, RANZANI, Nov. Comm. Ac. Scient. Inst. Bonon., 324, taf. 5, pl. 25, 1842, Brazil (*fide* GUICHENOT; not seen by us.)

Scarus erythrinoides, GUICHENOT, Scarides, Mus. Paris, 10, 1865, San Domingo.

Scarus oxybrachius, POEY, Synopsis, 342, 1868, Cuba.

Scarus abildgaardi, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 175, 1839; GÜNTHER, Cat., IV, 209; GUICHENOT, Scarides, Mus. Paris, 10; POEY, Enumeratio, 111; COPE, Trans. Am. Philos. Soc. 1871, 462.

Sparisoma abildgaardi, SWAINSON, Nat. Hist. Class. Fishes, etc., II, 227, 1839; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 97; JORDAN, Proc. U. S. Nat. Mus. 1886, 47; JORDAN, Review Labroid Fishes, 676, 1890.

2047. SPARISOMA DISTINCTUM (Poey).

Depth $3\frac{1}{5}$ in length; eye 5 in head, 2 in snout; snout sharp; body deep, usually a small posterior canine, this, however, often absent; scales of lateral line with a central tube, which bifurcates and which has a very short simple branch at base (a character which separates the species from *S. frondosum*). Sides with 3 rather faint dark streaks, alternating with 3 pale ones; back greenish, sides brown; belly rosy; first dark streak between lateral line and back; second broad, from opercle backward, third narrow on sides of belly; a black axillary spot above; red spots below lower jaw; pectoral yellowish; other fins reddish, with points and shades of carmine; a pale space on caudal peduncle behind dorsal.[*] Cuba and Jamaica, south to Bahia; not rare. (Poey.) A specimen from Bahia is thus described: Depth 3; caudal fin lunate, the angles short but sharp (rounded in the very young); dentition of *Sparisoma flavescens;* cheek with 3 scales. Mottled olive brown; body with 3 or 4 pale longitudinal streaks, the upper running to a faint pale blotch on back of tail between 2 dark-brown blotches; caudal distinctly pale-edged behind and more distinctly barred than in *S. flavescens,* the margin abruptly whitish; spot at base of pectoral brownish and very faint; about 4 small dusky blotches along base of dorsal, the last one most distinct at base of last ray; caudal with many cross bars and blotches; snout dusky; chin with 1 or 2 whitish cross bars; caudal concave, with sharp angles; dorsal and anal mottled with brown; pectorals and ventrals plain; young with dark opercular blotch and dark points about eye. (***distinctus,*** distinct, from the dark streaks.)

Scarus distinctus, POEY, Memorias, II, 423, 1861, Havana; POEY, Repertorio, II, 163; POEY, Synopsis, 341; POEY, Enum., 114.

Sparisoma distinctum, JORDAN, Review Labroid Fishes. 676; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 119.

Scarus frondosus, GÜNTHER, Cat., IV, 210; not of CUVIER.

2048. SPARISOMA CHRYSOPTERUM (Bloch & Schneider).

(BLUE PARROT-FISH; VIEJA.)

Head 3¼ (4¼ with caudal); depth 2⅞ (3⅘). D. IX, 10; A. II, 9; scales 2½–24–6. Body oblong; a strong canine directed outward and backward toward angle of mouth in upper jaw; besides this about 3 smaller canines toward front of jaw, chiefly turned forward; upper lip covering about ½ of upper jaw. Eye 5⅔ in head; snout not obtuse, 2¾; cheek with a single row of 3 or 4 large scales; each pore of lateral line ramose, many times forked, and covering most of the scale, the pores more branched than in any other of our species; 4 scales on median line before dorsal. Caudal deeply lunate, the outer rays much produced, upper lobe the longer, twice as long as inner rays, as long as head. Color in life, bright blue, almost everywhere tinged with green; head and portion behind pectorals brighter; an ill-defined pale band on lower part of side; dorsal and anal and middle of caudal brick red; edge of caudal blue; ventrals bluish green; pectorals greenish yellow, their base red around a large black spot; teeth bluish; jaws pale. In spirits the blue is more or less faded, leaving the fish chiefly green, darker on head; the red and yellow of fins become pale grayish. According to Poey, there is usually a dark blue horizontal stripe along sides behind pectoral fin. Length of example described (from Havana) 13 inches. West Indies, not rare; recorded from Cuba, St. Thomas, Jamaica, Martinique, Guadeloupe, San Domingo, St. Croix, St. Kitts, and Bahia. (*χρυσός*, golden; *πτερόν*, wing or fin.)

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[*] One of Poey's types of *Scarus distinctus* is in the National Museum. It agrees very closely with *Sparisoma rubripinne*, differing chiefly in the presence of a posterior canine and in the more sharply defined coloration. Specimens from Jamaica show the following characters: Sides olivaceous, mottled with darker, an indistinct dark band from above pectoral to caudal; vertical fins mottled with bright red, especially posteriorly, the caudal being entirely red in some specimens; a white cross blotch on tail behind dorsal; the scales below more or less distinctly pale edged; pectorals tinged with yellowish olive; ventrals white; some specimens with the belly and ventral fins almost entirely red, the outer rays only being white, others with but little red anywhere.

Vieja, PARRA, Descr. Dif. Piezas Hist. Nat. 1787, 58, pl. 28, fig. 4, Cuba.

Scarus chrysopterus, BLOCH & SCHNEIDER, Syst. Ichth., 286, pl. 57, 1801, American seas; figure apparently from a dried skin; CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 185, 1839; GÜNTHER, Cat., IV, 12, 1862; GUICHENOT, Scarides, Mus. Paris, 12, 1865; COPE, Trans. Am. Philos. Soc. 1871, 462.

Scarus chloris, BLOCH & SCHNEIDER, Syst. Ichth., 289, 1801, Cuba; after PARRA; GOODE, Bull. U. S. Nat. Mus., V, 34, 1876.

Scarus lateralis, POEY, Memorias, II, 219, 1860, Cuba; POEY, Synopsis, 337, 1868.

? ? *Scarus spinidens*,[*] GUICHENOT, Scarides, 15, 1865, Bahia. (Coll. Univ. de Genève.)

Sparisoma chrysopterum, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 94; JORDAN, Proc. U. S. Nat. Mus. 1886, 47; JORDAN, Review Labroid Fishes, 674, 1890.

2049. SPARISOMA LORITO, Jordan & Swain.

Head $3\frac{1}{5}$ (4 with caudal); depth $2\frac{5}{6}$ ($3\frac{4}{5}$); eye rather large, $4\frac{2}{3}$ in head; snout rather acute, $2\frac{2}{3}$. D. IX, 10; A. II, 9; scales $2\frac{1}{2}$–24–6. Body oblong, moderately deep; 1 or 2 small canines on each side, directed outward and backward, in front of the angle of the mouth, 1 on each side, 2 on the other, in the typical specimen; upper lip covering more than $\frac{1}{2}$ of upper jaw; cheeks with a single row of large scales; pores of lateral line less branched than usual in this genus, not covering nearly the whole surface of the scale, those on the caudal peduncle most branched, those on the anterior region mostly once or twice forked; 4 scales on median line before dorsal. Caudal fin deeply lunate, the outer rays much produced, the upper lobe slightly the longer, nearly twice as long as inner rays, and nearly as long as head. Color in life, pearly blue, the color mixed with greenish and gray; jaws pale; teeth pale; dorsal reddish, tinged with gray; lobes of caudal greenish gray, washed with brown, center of fin reddish, posterior margin grayish; anal rather dull scarlet mixed with gray; ventrals pinkish; pectorals light yellowish olive, a dark blotch at base above. Color in spirits, brownish olive on dorsal region, grayish olive mixed with crimson on sides, and light green below;

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[*] *Scarus spinidens* is thus described by Guichenot:

"Body oblong, the snout slightly convex; upper jaw rough with salient, conic points in 2 or 3 irregular rows; lower jaw with stronger crenulations and marked by teeth in quincunx; scales of lateral line each with a pore having a short stem and sending branches over the whole scale. Caudal lunate, its angles much produced, as long as the fin itself. Color silvery red, paler below, each scale with a brown spot. Head red, varied with pale yellow; dorsal reddish; anal and ventrals yellow, the former edged with violet. Caudal red medially, the upper and lower edges and the interval between them violet; a large black spot at base of pectorals, which are violet, edged with yellow. Length of sole specimen (from Bahia) 420 mm., to middle rays of caudal."

This species is evidently close to *Sparisoma chrysopterum*, but the colors are not the same.

head greenish; purplish on cheeks, light green below; lips green; dorsal and anal orange, the rays grayish dusky; caudal pale orange, the outer rays greenish, the posterior margin of fin dusky; ventrals flesh color, tinged with pinkish; pectorals orange olive, the base of upper rays with a dark spot, its axil pale. West Indies. Here described from the type, an adult specimen 10 inches in length, taken at Havana. Other specimens are in the museum at Cambridge from St. Thomas, Sombrero, Barbados, and Jérémie, Hayti, and in Stanford University from Jamaica. Although it is evidently not a rare species, we are unable to identify it with any of those described by Poey, or by Cuvier & Valenciennes. (*lorito*, Spanish diminutive of *loro*, parrot.)

Sparisoma lorito, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 95, Havana (Coll. D. S. Jordan); JORDAN, Proc. U. S. Nat. Mus. 1886, 47; JORDAN, Review Labroid Fishes, 674, 1890; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 120.

2050. SPARISOMA VIRIDE (Bonnaterre).

(DARK GREEN PARROT-FISH.)

Caudal fin in adult deeply forked, the upper lobe about as long as the head, and twice or more the length of the inner rays, variegated; canines 1 or 2 on each side; upper and lower caudal lobes greenish. Deep blue, scales edged with brownish, which above makes 1 or 2 continuous streaks; top of head light grayish brown, a similar band from eye to above gill opening, another paler stripe from opercle to corner of mouth and edges of both lips; edge of opercle below pale grayish, changing to bright orange above, a deep-yellow spot at tip of opercle; no inky-black spot on opercle; lips deep blue except for the gray edging; head below livid olive; dorsal light yellowish, tips of spines and rays normally blue, base of soft part blue; anal bluish gray, with deep-blue band at base and edge; pectoral blue gray, edged with bright blue above, tips broadly orange; caudal blue green, with a lunate yellow band, behind this a deep-blue band, tips of rays pale, outer rays deep blue, a faint band of golden gray at base; ventrals yellowish, blue anteriorly. West Indies; generally common; one of the largest and most strongly marked of the parrot-fishes; the specimens here described from Jamaica, Sombrero Key and St. Thomas. (*viridis*, green.)

Piscis viridis bahamensis (the Parrot-fish). CATESBY, Nat. Hist. Car., II, 29, pl. 29, 1738, Bahamas.

Scarus viridis, BONNATERRE, Enc. Méth., X, 96, 193, 1788, Bahamas, after CATESBY; not *Scarus viridis*, BLOCH, 1790.

Callyodon psittacus, GRONOW, Ed. Gray, 84, 1854; not of LINNÆUS.

Scarus melanotis, BLEEKER, Notices Ichthyologiques, I-X, 4, 1862, St. Croix.

Scarus catesby, LACÉPÈDE, Hist. Nat. Poiss., IV, 16, 1803; after CATESBY.

Scarus catesbœi, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 183, 1839; POEY, Repertorio, I, 372, 1867; GUICHENOT, Scarides, II, 1865; GÜNTHER, Cat, IV, 210, 1862.

Sparisoma catesbyi, BEAN & DRESEL, Proc. U. S. Nat. Mus. 1884, 153.

Sparisoma catesbœi, JORDAN, Proc. U. S. Nat. Mus. 1884, 191.

Sparisoma viride, JORDAN, Review Labroid Fishes, 675, 1890; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 120.

Subgenus EUSCARUS, Jordan & Evermann.

2051. SPARISOMA STRIGATUM (Günther).

Upper jaw without posterior lateral canines. Scales of the lateral line, those on the nape, and a few on the opercles, black shining violet; dorsal spines stout, the anterior not much longer than the orbit. General color olive (in spirits); outer parts of the vertical fins violet; posterior part of the axil blackish violet. (Günther.) Locality unknown. As the genus *Sparisoma* is chiefly confined to American waters, we include this species in the present paper as probably American. (*strigatus*, striped.)

Scarus strigatus, GÜNTHER, Cat., IV, 212, 1862, locality unknown.
Sparisoma strigatum, JORDAN, Review Labroid Fishes, 671, 1890.

2052. SPARISOMA FLAVESCENS (Bloch & Schneider).

(MUD PARROT; VIEJA COLORADA; VIEJA MUGER.)

Head 3⅓ (4 with caudal); depth 2⅚ (3½). D. IX, 10; A. II, 9; scales 2½–24–6; eye 5⅓ in head; snout 2⅗. Body oblong; no canine teeth; upper lip covering most of upper jaw; eye rather small; snout bluntish; cheek with a single series of about 5 large scales; tubes of lateral line dividing into about 5 branches, covering most of the scale; 4 scales on median line before dorsal; pectoral fin reaching past tips of ventrals; origin of ventral spine under middle of pectoral base; caudal fin slightly lunate, the upper lobe longer and narrower than the lower, 1¼ in head; the prolongation of the outer rays varies somewhat and is greatest in the adult; the concavity of the fin is evident in specimens 3 inches long, but in the very young the fin is truncate or even slightly convex. A few specimens of 6 to 8 inches are in the collection in which the caudal fin appears fairly truncate when spread open, the angles remaining acute. In most cases, however, the fin is slightly concave. Color of adult in life, olivaceous, somewhat clouded with light and dark, and usually flushed with pinkish, especially below, the edges of the scales more yellow olive; scales of belly and lower parts light orange red toward their bases, giving a decidedly reddish cast; dorsal mottled with different shades of olive; caudal creamy, mottled and barred with darker orange, the markings more distinct on the outer edge; ventrals and anal rich cherry red, mottled and barred with brown; pectorals light orange red, the color formed by narrow orange cross streaks on a paler ground; a light band across lower jaw, which is otherwise brown; teeth white; a dusky or black blotch at base of pectoral; sometimes blackish spots on the scales at the base of the soft dorsal. In spirits the red of body and fins and yellow on scales become pale. Young individuals have small, bright, rosy spots on sides of back; 2 faint, darker, longitudinal shades along side. Length of specimen described (Key West) 7½ inches. West Indies; Key West to Rio Janeiro, everywhere the commonest species of the genus. This species is excessively common at Key West, swarming everywhere about the island in the eelgrass. It rarely exceeds a foot in length. At Havana it is apparently equally common, the numbers seen in the market exceeding that of all other species combined. It is one of the least brightly colored of the species of the genus. As a food-fish, this, like the others, is held in low esteem. The flesh, although not unpleasant in flavor, is soft and rather poor. In the Havana market it is usually called *Vieja colorada*, but the species of this group are seldom distinguished by the fishermen. We have examined specimens from St. Thomas, Jérémie, Hayti, Port au Prince, Tortugas, Nassau, Rio Janeiro, Jamaica, and St. Lucia. There is considerable variation in the amount of redness in this species, large ones being usually more rosy than the young. (*flavescens*, yellowish.)

Vieja, Parra, Descr. Piezas Dif. Hist. Nat. 1787, 59, pl. 28, fig. 4, Cuba.

Scarus flavescens, Bloch & Schneider, Syst. Ichth., 290, 1801; after Parra; Poey, Enumeratio, 113, 1875 (identification of *Scarus squalidus* with Parra's figure); Jordan, Proc. U. S. Nat. Mus. 1884, 137.

Scarus squalidus, Poey, Memorias, ii, 218, 1860, Cuba; Poey, Synopsis, 338; Jordan & Gilbert, Synopsis, 938, 1883; Günther, Cat., iv, 212, 1862.

Callyodon flavescens, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 288, 1839.

Sparisoma flavescens, Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 92; Jordan, Proc. U. S. Nat. Mus. 1886, 47; Bean, Bull. U. S. Fish Comm. 1888, 198; Jordan, Review Labroid Fishes, 672, 1890; Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 119.

2053. SPARISOMA RUBRIPINNE (Cuvier & Valenciennes).

Head 4 in total length with caudal; depth 3½; eye 5¾ in head, 2¾ in snout, 2 in distance from angle of mouth; no posterior canine; lower jaw projecting; pores on head; suborbital with venules; a fleshy prominence on forehead; scales of lateral line with 3 or 4 ramifications. Adult with the caudal truncate, not concave, the points very slightly salient. Olivaceous; a yellow transverse band below mouth; dorsal olivaceous, clouded with dark points on the soft rays; anal rosy, clouded; ventral rosy, with red and white points; pectoral yellowish, with a diffuse reddish-brown spot at its base above; caudal olivaceous, with clear brown points; a vertical band of clear yellowish, separated from the margin by an orange area; another specimen has the caudal orange olive, with irregular bands, the subterminal bar not pronounced. West Indies. This description is based upon the specimen which Poey took as the type of his *Scarus truncatus*, which we are unable to separate from this species. A specimen 9 inches long, from Jamaica, in alcohol, was olive, mottled with lighter, nearly white below; a rather distinct white band below chin; dorsal mottled; caudal strongly marked with cross blotches, a pair of subterminal blotches of white which nearly meet in the middle; other fins all white, the pectoral dusky (not black) at base; no yellow blotch behind dorsal. Margin of caudal concave; forehead strongly convex. (*ruber*, red; *pinna*, fin.)

Scarus rubripinnis, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 199, 1839, San Domingo (Coll. Ricord); Günther, Cat., iv, 211; Guichenot, Scarides, 13, 1865.

Scarus virens, Cuvier & Valenciennes, Hist. Nat. Poiss., xiv, 203, 1839, Porto Rico (Coll. Plée), Martinique (Coll. Achard).

Sparisoma rubripinne, Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 119.

Scarus chloris, Guichenot,* Scarides, 14, 1865, type of *Scarus virens*; not of Bloch & Schneider.

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* Guichenot gives the following account of the types of *Scarus virens*, called by him *Scarus chloris:*

"Body short, thick; upper jaw scarcely denticulate on the edge; no posterior canines; lower jaw granulated and strongly crenulate on the edge; caudal squarely truncate. Color water green, tinged with brown, ventrals reddish, as is also the anal, where there are small brown spots forming faint bands."

Scarus truncatus, POEY, Synopsis, 339, 1868, Havana; POEY, Enumeratio, 114, 1875; POEY, Fauna, Puerto Riqueña, 308, 1878.

Scarus circumnotatus,[*] POEY, Memorias, 423, 1861, Havana; POEY, Synopsis, 340, 1868.

? *Scarus emarginatum*,[†] POEY, Synopsis, 340, 1868, Havana.

2054. SPARISOMA BRACHIALE (Poey).

Head $3\frac{1}{5}$ (4 with caudal); depth $2\frac{7}{8}$ ($3\frac{4}{7}$). D. IX, 10; A. II, 9; scales $2\frac{1}{2}$-24-6. Body moderately deep; no canine teeth; lateral line ending under last ray of soft dorsal and beginning again about 2 scales farther forward, so that the two parts overlap; eye rather large, $4\frac{1}{2}$ in head; snout rather acute, 3; cheek with a single row of about 4 scales; 4 scales before dorsal, 3 before ventrals; each pore of lateral line with 4 to 7 branches which cover most of the scale; 4 scales on median line before dorsal. Pectorals reaching slightly past tips of ventrals; caudal fin moderately lunate, the middle part a little convex when the fin is spread open, the outer rays moderately produced, the upper lobe $1\frac{2}{3}$ in head. Color in spirits, dark olive green above, somewhat mottled; paler below; a faint greenish streak running backward from angle of mouth; jaws pale; no distinct spots or stripes on body; teeth pale; dorsal dusky gray; caudal mesially reddish, somewhat mottled, its posterior border bluish; ventrals and pectorals pale, slightly greenish; a very distinct dark blotch at base of upper rays of pectoral; the axil pale. Cuba. Here described from a single specimen $7\frac{1}{2}$ inches long. In spirits its colors are quite different from those of *S. flavescens*, though in other respects the two bear much resemblance. (Latin, *brachium;* Greek, *βραχίων*, the arm, from the axillary spot.)

Scarus brachialis, POEY, Memorias, II, 345, 1861, Cuba; POEY, Synopsis, 337 (misprinted *braquialis*); POEY, Enumeratio, 113.

? *Scarus humeralis*, POEY, Memorias, II, 422, 1861, Havana; based on old drawing; a black axillary spot, sown with white points.

Sparisoma frondosum, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 93; JORDAN, Proc. U. S. Nat. Mus. 1886, 47 (not *Scarus frondosus*, CUVIER).

Sparisoma brachiale, JORDAN, Review Labroid Fishes, 673, 1890.

2055. SPARISOMA MASCHALESPILOS (Bleeker).

Outer rays of caudal produced to about $\frac{1}{2}$ the length of the head; a dark spot at base of pectoral. General color dusky red; fins yellowish red; caudal violaceous; scales of the back and sides with many red spots.

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[*] *Scarus circumnotatus* is thus described:

"Head more than 4 in total; depth $3\frac{1}{2}$; eye 5 in head, 2 in snout, more than 1 in distance to angle of mouth; venules below and behind eye; profile regular, without depression or prominence; no pores above head; no posterior canines; scales of lateral line with 4 branches; caudal truncate or with slight points at the angle; pectoral short, 6 in length. Greenish blue; dorsal and anal green, with brown points on the soft rays and on the caudal membranes; anal reddish with brown shades; pectorals and ventrals vermilion, the latter with translucent points; no black spot in the axil; some yellowish under the head."

[†] *Sparisoma emarginatum* is thus described:

"Very close to *S. circumnotatus*, differing in having the mouth lower and farther from the eye, the back higher, the belly less curved, the form therefore less elegant; preopercle slightly emarginate behind; venules less marked; front of head with porous roughnesses; caudal truncate; pectoral $5\frac{1}{2}$ in length; no posterior canines. Greenish, with some brownish scales intermixed, the edge of each scale brownish; pectoral pale, with cross series of white points. Length 185 mm." Cuba. (Poey).

Surinam. (Bleeker.) Not seen by us. It is perhaps distinct from *S. brachiale,* though evidently closely allied. (*μασχάλη*, armpit; *σπῖλος*, spot.)

Scarus maschalespilos, BLEEKER, Notices Ichthyologiques, I–X, 5, 1862, Surinam.
Sparisoma maschalespilos, JORDAN, Review Labroid Fishes, 673, 1890.

2056. SPARISOMA FRONDOSUM (Cuvier).

Three large scales on cheek; dorsal spines rather slender but pungent; caudal emarginate; tubes of each scale of lateral line much ramified and extending over the whole scale; teeth of moderate size, very distinct on the edges of the jaws; no posterior canines.* Coloration uniform dark purplish violet. (Günther.) Jamaica to Brazil; evidently closely related to *Sparisoma rubripinne,* but distinguished by the branched pores. (*frondosus,* branched.)

Scarus frondosus (CUVIER MS.) AGASSIZ, Spix, Pisc. Brasil., 98, 1829, Bahia (Coll. Spix); CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 204, 1839; GUICHENOT, Scarides, 1865, 15; JORDAN, Proc. U. S. Nat. Mus. 1886, 542 (note on type).
Scarus aracanga, GÜNTHER, Cat., IV, 209, 1862, Jamaica.
Sparisoma aracanga, JORDAN, Review Labroid Fishes, 674, 1890.

649. SCARUS, Forskål.

(LOROS: PARROT-FISHES.)

Callyodon, GRONOW, Museum Ichthyol., II, 8, 1764 (*croicensis*); nonbinomial.
Scarus, FORSKÅL, Descr. Animal, etc., in Orient. Observ., 25, 1775 (*psittacus*, etc.); not of GRONOW, 1764, which (nonbinomial) = *Labrus L.*
Calliodon, BLOCH & SCHNEIDER, Syst. Ichthyol., 312, 1801 (*lineatus* = *croicensis*).
Hemistoma, SWAINSON, Class'n Fishes, etc., II, 226, 1839 (*reticulatus* Swainson = *pepo* Bennett) (= *Scarus*).
Petronason, SWAINSON, Class'n Fishes, etc., II, 226, 1839 (*psittacus*, etc.) (= *Scarus*).
Erychthys, SWAINSON, Class'n Fishes, etc., II, 226, 1839 (*croicensis*, etc.).
Chlorurus, SWAINSON, Class'n Fishes, etc., II, 227, 1839 (*gibbus*) (= *Scarus*).
Callyodon, GRONOW, Systema, Ed. Gray, 83, 1854 (*lineatus*, etc.).
Scarus, JORDAN & GILBERT, Synopsis, 938, 1883 (*psittacus*).
Calliodon, JORDAN, Proc. U. S. Nat. Mus. 1886, 591 (*croicensis*).

Lower pharyngeals spoon-shaped, ovate-oblong, transversely concave; teeth in each jaw fully coalescent, appearing as tessellations on the surface; jaws with distinct median suture; the edges of jaw even, the teeth whitish or rosy in color, never green. Upper pharyngeals each with 2 rows of teeth; gill membranes scarcely united to the narrow isthmus, across which they form a broad fold; dorsal spines flexible, scarcely different from the soft rays; upper lip laterally double, the interior fold becoming very narrow or obsolete mesially; lower jaw included in the closed mouth; lateral line interrupted posteriorly, commencing again on the next series of scales below; tubes of lateral line scarcely branched; scales on cheek in 2 to 4 rows; scales in front of dorsal on median line 6 to 8. Dorsal rays IX, 10; anal II, 9 in all species; scales 2½–24–6. Body robust. Species very numerous, mostly of large size, found in nearly all tropical seas. The name *Scarus* was used by the ancients and by some pre-Linnæan writers on zoology for the Mediterranean species of *Sparisoma, Labrus cretensis* Linnæus. By Gronow, a nonbinomial writer, in 1764, *Scarus* was applied to a group substantially identical with the Linnæan genus *Labrus.* The first use of *Scarus* as a generic name in binomial nomenclature is that of Forskål in 1775. The genus *Scarus* of Forskål was based on several species obtained by him on the coasts of Arabia. A few of these are not Scaroids. The others all belong to this group. Forskål had apparently no acquaintance with *Labrus cretensis,* and this species can not in any proper sense be taken as the type of his genus. One of the species mentioned by him should be so taken, and as all his species belong to the same genus it makes no special difference which one is selected. Jordan & Gilbert have regarded *Scarus psittacus* Forskål as the type. If *Sparisoma cretense* should be taken as the type of *Scarus,* the proper name for the present genus would be *Calliodon,* and several of the useless generic names of Swainson have priority over *Pseudoscarus.* The genus *Scarus* contains the majority of the species of the *Scaridæ.* It is more widely distributed than the other genera; its species reach for the most part a larger size, and in general they are more brightly colored than the others. (*σχάρος,* Scarus, ancient name of *Sparisoma cretense,* said by Rondelet to be from *σχαίρων,* to pasture.)

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* We are indebted to Dr. G. A. Boulenger for the information that in the types of *Sparisoma strigatum* and *S. aracanga* there are no posterior canines.

SCARUS:

a. Upper jaw with from 1 to 4 posterior canines.
b. Cheek with from 2 or 3 rows of scales.
c. Head with a longitudinal band; a yellow longitudinal stripe on body; outer rays of caudal not colored like the inner; caudal subtruncate.
d. Outer rays of caudal blackish or greenish, darker than the median rays.
e. Yellow stripe above pectoral about on a level with the eye; outer rays of caudal deep greenish blue; upper jaw with 1 posterior canine (rarely duplicated); 2½ rows of scales on cheek; head with 2 bluish-green stripes, the interspace reddish or yellow; dorsal and anal each with 2 green bands and 1 orange one, the anal having a roundish blue spot on the membrane between every 2 rays. General color bluish green mixed with orange. PUNCTULATUS, 2057.
ee. Yellow stripe above pectoral, mostly below the level of the eye; outer rays of caudal blackish, the rest of the caudal green; upper jaw with 2 posterior canines; 2 rows of scales on cheek; upper part of head dark green, below eye bright yellowish green, with bluish markings on opercle; dorsal bright green at base; ventrals pale; base of pectoral with a blue-black mark. General color in life, bright green; darker on the back, paler below. BOLLMANI, 2058.
dd. Outer rays of caudal orange, lighter than the median rays, its edge blackish; yellow stripe above pectoral, below the level of the green stripes on the head, which are nearly horizontal; upper jaw with 1 posterior canine (rarely duplicated); 2½ rows of scales on cheek; head with 2 bluish-green stripes, the interspaces reddish or yellow; dorsal and anal each with 2 green bands and 1 orange one, the latter without blue spots; basal band of dorsal not broken into green spots. General color bluish green, mixed with orange. TÆNIOPTERUS, 2059.

cc. Head without longitudinal bands; posterior canines 2 to 4.

f. Caudal truncate; 2 series of scales on cheeks, and 2 scales on lower preopercular limb; canines 2 or 3 on each side. Color uniform violet purple; vertical fins very dark. ARACANGA, 2060.

ff. Caudal fin lunate, the outer rays more or less produced; cheeks with 2½ or 3 rows of scales; posterior canines 3 or 4; color (dried skin) plain brownish, the caudal in 1 specimen darker, or paler mesially, its border and angles dark. TRISPINOSUS, 2061.

bb. Cheeks with 4 rows of scales; angles of caudal more or less salient.

g. Color dusky olivaceous, some scales with a rosy blotch at base; dorsal edged with dusky; caudal dark, pale at base, and with pale shades, its angles little produced; opercle with blue blotches; canines 3; 4 rows of scales on cheek; snout rather acute; 7 scales before dorsal. CUZAMILÆ, 2062.

gg. Color dark sky blue; jaws with bright colors; fins chiefly blue, darker on pectoral and front of caudal; middle of dorsal reddish, with blue spots; a red band near the edge of the caudal, 1 on the base of the anal and 1 near the upper edge of the pectorals; ventrals mostly red, their external border blue; caudal with very salient angles; upper jaw with red and blue edgings; snout moderate; 2 (rarely 3) lateral canines in upper jaw. Scales brown edged; eye with blue spots above and behind; a green band from the angle of the mouth, bordered above and below by red. Teeth quite small. VETULA, 2063.

ggg. Color brown, with 2 brown lateral bands. GNATHODUS, 2064.

CALLIODON (καλλίς beauty; ὀδούς, tooth):

aa. Upper jaw without canines; 2½ series of scales on cheek.

h. Third (partial) row of scales of the cheek of 3 or 4 scales*, those of the upper row little larger than those of the second row*.

i. Caudal slightly rounded, its outer rays not produced.

j. Sides of body with 2 broad dark longitudinal shades; sides of belly each with 3 sharply defined lines, each on a row of scales, these stripes running from the breast to beyond front of ventrals (these lines usually becoming faint or even obsolete in old individuals).

k. Stripes on side of breast, if present, whitish. Color dark reddish brown above, paler below; back dark; sides with 2 dark parallel stripes of the color of the back, separated by paler interspaces, the upper one extending backward from eye; snout above bluish brown; a narrow whitish streak running from head along the middle line of belly; a faint dark spot on base of pectoral; caudal pale orange red, the outer rays somewhat barred with brown; dorsal orange, edged with bluish; other fins nearly plain. CROICENSIS, 2065.

kk. Stripes on side of breast, if present, inky blue. Color bright green, olivaceous above, paler below, the lower half of the body becoming posteriorly more and more yellow, and on the lower half of the caudal peduncle bright light yellow, this color being brightest above front of anal; longitudinal shades on sides of body bright crimson, separated on the head by a band of green; no spot on base of pectoral; caudal fin green, its lower half yellow; dorsal, anal, and pectorals green, at least at base; ventrals yellow. EVERMANNI, 2066.

jj. Sides of body without distinct, broad, darker stripes. Color brown; no bands or lines upon body or head; dorsal spotted with violet and edged above and below with yellow, like the caudal; caudal without spots; yellow line near the edge, and another along the base of the dorsal. FLAVOMARGINATUS, 2067.

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* These two characters not verified in *Scarus flavomarginatus* nor in *S. acutus.*

ii. Caudal truncate, its points slightly salient; sides with a broad whitish band. ACUTUS, 2068.

hh. Third (partial) row of scales on the cheek of 1 or 2 scales only; scales of the upper row much larger than those of the second row; caudal subtruncate, its outer rays more or less produced, becoming much elongate with age; adult with a fleshy hump above the snout.

l. Color bright blue, the young more or less shaded with reddish brown; fins mostly blue. Size large. CÆRULEUS, 2069.

ll. Color dusky olive; a pale-yellowish streak from upper part of eye to upper base of caudal. EMBLEMATICUS, 2070.

Subgenus SCARUS.

2057. SCARUS PUNCTULATUS (Cuvier & Valenciennes).

Head 3⅛ (3⅔ with caudal); depth 3⅓ (3⅚); eye small, 5¼ in head; snout rather acute, 2⅔ in head. D. IX, 10; A. II, 9; scales 2½–24–6. Body oblong-elliptical; a canine directed outward above angle of mouth on each side; a second small canine present on each side in the specimen described; upper lip covering about ½ of the surface of the upper jaw; cheek with 2 rows of scales, those of the upper row being about ⅓ larger than those of the second row, 2 scales below the lower series; 7 scales before dorsal; origin of ventral fins directly under pectoral, tips of fins not reaching quite halfway from their base to front of anal; pectoral reaching about midway between tips of ventrals and front of anal; caudal fin truncate or slightly rounded when spread open, the angles not produced; the outer rays 1¾ in head (in specimen of 6 inches). In life, orange brown; the centers of most of the scales bright bluish green, these blotches large, so that the green predominates over the orange on most of the body; on the anterior part of the back and on the top of head there is little green, this region being more brown; a light-yellow longitudinal band, higher up than the similar band in *S. tæniopterus*, and above the level of the green stripes on head, running backward from upper part of gill opening nearly to the end of pectoral; below this is a dark-grayish band, about as broad as eye, extending about to end of pectorals; this is bordered above and below by bright green; these green stripes become very distinct on the head, where they extend forward on snout, 1 above and 1 below the eye, the lower meeting its fellow on the upper lip, the upper on the forehead; interspace between these bands dark gray; jaws whitish; a grass-green band around lower jaw; lower half of head light yellowish green; belly pale greenish; dorsal and anal bright green at base and tip, mesially orange, the orange with a median more or less interrupted band of blue, the corresponding band on anal forming a row of spots; caudal bright greenish blue, the outer rays entirely blue, the inner with their membranes orange; pectoral pale yellow, the axil not dusky. West Indies; rather common; one of the most brilliant of the group. It may be known by the coloration of the anal fin, which has suggested the name *punctulatus*. Here described from a specimen 6 inches in length, from Havana. Another from Porto Rico is in the museum at Cambridge. (*punctulatus*, dotted.)

Scarus punctulatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 195, 1839, Martinique; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 89; JORDAN, Review Labroid Fishes, 682, 1890; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 121.

Pseudoscarus punctulatus, GUICHENOT, Scaridés, Mus. Paris, 26, 1865.

Scarus diadema, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 196, 1839, Martinique; COPE, Trans. Am. Phil. Soc. 1871, 461.

Pseudoscarus diadema, POEY, Synopsis, 347; POEY, Enumeratio, 116; GUICHENOT, Scaridés, 28, 1865 (note on types).

Pseudoscarus tæniopterus, GÜNTHER, Cat., IV, 226, 1862, Trinidad; excellent description; not of DESMAREST.

Scarus tæniopterus, JORDAN, Proc. U. S. Nat. Mus. 1886, 47.

2058. SCARUS BOLLMANI, Jordan & Evermann.

Head 3⅕ in length (3⅘ in total); depth 3⅕. Two small blunt posterior canines in upper jaw, near angle of mouth; caudal short, almost truncate, the middle rays a little shorter than the outer ones; 2 rows of scales on cheek. In life, bright green, darker on the back, paler below; a broad lateral band mostly below level of eye and twice width of eye, of a brilliant orange-yellow color extending from gill opening to opposite vent, where it ceases almost abruptly; upper part of this band a yellow streak more than ½ as wide as eye, and nearly on level of pupil, persistent and bright yellow in alcohol, while the orange fades to pale; behind the vent, the side is a little brassy or yellowish, this shade scarcely contrasting with the green ground color; there is also in life an ill-defined band of blood red nearly a scale wide above and below the ground color; base of pectoral with a blue-black mark, upper part of head dark green, below eye, bright yellowish green, with some bluish markings on opercle; caudal fin green, its outer rays blackish; other fins injured in both the typical examples, the dorsal bright green at base, ventrals pale; teeth pale. Gulf of Mexico, in deep water. Two specimens were obtained from stomachs of Red Groupers (*Epinephelus morio*), the first one by Mr. Charles H. Bollman, off Tampa Bay. The second was sent later by Mr. Stearns. The latter, 5 inches long, is especially the type of the foregoing description. (Named for Charles Harvey Bollman.)

Scarus bollmani, JORDAN & EVERMANN, Proc. U. S. Nat. Mus. 1886, 470, off Tampa Bay (Type, No. 37993. Coll. Silas Stearns); JORDAN, Review Labroid Fishes, 683, 1890

2059. SCARUS TÆNIOPTERUS, Desmarest.

Head 3 (3⅔ with caudal); depth 2⅔ (3⅓). D. IX, 10; A. II, 9; scales 2½–24–6. Body oblong-elliptical. A canine directed backward and outward above the angle of the mouth; upper lip covering more than ½ of surface of upper jaw; eye small, 6 in head; snout rather acute, 2⅚ in head; cheek with 2 nearly equal rows of about 6 scales each, 1 or 2 large scales below the lower series; 8 scales on median line of back before dorsal; pectoral reaching just past tips of ventrals; origin of ventral spine under posterior end of pectoral base; tips of ventrals scarcely reaching to midway between their base and front of anal; caudal fin when spread out very slightly rounded, the outer rays very slightly produced, 1⅖ in head, in specimens of 9 inches. Color in life, dark orange brown above; the center of each scale greenish blue; rather abruptly paler below, where the blue predominates as it does also on caudal peduncle; sides of head with 2 horizontal stripes of deep bluish green, running from angle of opercle through eye and meeting around snout, the interspace anteriorly yellowish, posteriorly brownish; head light greenish below; jaws pale; 2 green stripes, with a yellowish interspace on lower jaw; a broad, bright-yellow band below level of green stripes of head, running from base of pectorals backward nearly to middle of body; dorsal fin greenish blue on lower half; above this a broad orange band, the fin margined with sky blue; caudal indigo bluish, with some vague yellow shades, the outer rays bright orange, edged with indigo bluish; anal greenish, blue at base, then a rather narrow stripe of orange, the outer half of the fin bluish; ventrals greenish and yellowish; pectoral light yellow, no dark blotch at its base. In spirits the orange fades to yellowish and the blue to bright green. The yellow lateral band is, in spirits, dashed with red. West Indies; generally common. Here described from specimens 9½ inches long from Havana, the types of *Scarus virginalis.* Others examined are from Porto Rico and St. Thomas. The name *psittacus* has been used by recent writers for this species. The original type of *Coryphæna psittacus*, sent by Dr. Garden from Charleston, is still preserved by the Linnæan Society of London. It has been examined by Dr. Bean, who has found it to be a *Xyrichthys.* (ταινία, ribbon; πτερόν, fin.)

Scarus tæniopterus,[*] DESMAREST, Dict. Classique, XV, 244, pl. 12, 1831, Cuba; CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 195 (same type); JORDAN, Proc. U. S. Nat. Mus. 1886, 543 (note on original type); JORDAN, Review Labroid Fishes, 683, 1890.

Scarus vetula, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 193, 1839, St. Thomas; not of BLOCH & SCHNEIDER; based on a figure of PARRA.

Pseudoscarus psittacus, GÜNTHER, Cat., IV, 225, 1862 (after *Coryphæna psittacus*, L., which is a species of *Xyrichthys;* not *Scarus psittacus*, FORSKÅL, an Asiatic species); GUICHENOT, Scaridés, Mus. Paris, 25, 1865; POEY, Synopsis, 347; POEY, Enumeratio, 116.

Scarus virginalis, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 88, Havana (Coll. Jordan); JORDAN, Proc. U. S. Nat. Mus. 1886, 47.

Pseudoscarus tæniopterus, GUICHENOT, Scaridés, Mus. Paris, 26, 1865.

Scarus psittacus, COPE, Trans. Am. Philos. Soc. 1871, 461.

2060. SCARUS ARACANGA (Günther).

Two series of scales on cheek, and 2 scales on lower preopercular limb; canines 2 or 3 on each side, the middle series composed of 6 scales; lips broad; jaws rosy, the upper with 2 or 3 small pointed prominences at the angle; teeth small; dorsal spines flexible; caudal truncated; 14 pectoral rays; tubes of the lateral line simple; lateral line interrupted. Color uniform violet purple; vertical fins very dark. Jamaica (Günther); unknown to us. According to Dr. Günther "it has exactly the same coloration (as *Sparisoma frondosum*), with which it may be easily confounded." (Portuguese name for some parrot.)

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[*] We have the following notes on the type of *Scarus tæniopterus* DESMAREST:

"Specimen 0.27 m. long in very bad condition; the color entirely faded. Cuba. (Desmarest.) The dorsal shows faintly 2 colors, with a spot at the base of each membrane."

Another specimen from the museum at Geneva, 0.30 m. long, is in better condition. The colors on the dorsal show more plainly, and there are 2 dusky bands on the anal. The outer ray of caudal above and below is paler than the others.

This is identical with the other specimen, and both seem to belong to the species called *Scarus virginalis*, by Jordan & Swain (Proc. U. S. Nat. Mus. 1884, 88).

Pseudoscarus aracanga, GÜNTHER, Cat., IV, 227, 1862, Jamaica.
Scarus aracanga, JORDAN, Review Labroid Fishes, 683, 1890.

2061. SCARUS TRISPINOSUS, Cuvier & Valenciennes.

The type, a dried skin, is thus described by Guichenot:

> Form of *Pseudoscarus guacamaia:* Jaws finely crenulate on the edge, their surface smooth, except on lower jaw; teeth pale; 3 posterior canines above; scales of cheek in 3 rows; caudal somewhat rounded, its angles prolonged in sharp points. Color uniform reddish brown, the caudal medially paler, its posterior margin and points blackish. A very large skin sent by the Museum of Lisbon, supposed to come from Brazil.

The specimen called *Scarus quadrispinosus* is not evidently different. This is a dried skin 400 mm. long and is thus described by Guichenot:

> Form of *Scarus tæniopterus:* Jaws trenchant, finely crenulate on the edge, their surface smooth; 4 canines on each side above; 3 rows of scales on the cheek and 4 or 5 on opercle; caudal squarely truncate, its lobes obtuse and very short. Color olive brown, paler on sides and belly, with no trace of bands nor lines on head nor fins; fins yellowish, except the caudal, which is dusky.

We have the following notes on the same specimen:

> Color entirely faded, possibly blue in life; 4 distinct posterior canines on right side of upper jaw (the left side broken); snout rather long; caudal simply lunate; cheek scales in 2½ rows; 7 scales before dorsal; axil pale; fins apparently pale and plain.

West Indies to Brazil. (*trispinosus*, three-spined.)

Scarus trispinosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 182, 1839, Brazil; JORDAN, Review Labroid Fishes, 684, 1890.
Scarus quadrispinosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 197, 1839, Martinique; GUICHENOT, Scaridés, 27, 1865 (note on type); JORDAN, Proc. U. S. Nat. Mus. 1886, 542 (note on type).
Pseudoscarus quadrispinosus, GOODE, Bull. U. S. Nat. Mus., V, 34, 1876.
? *Pseudoscarus chloris*,* GÜNTHER, Cat., IV, 227, 1862; not *Scarus chloris*, BLOCH & SCHNEIDER.
Pseudoscarus trispinosus, GUICHENOT, Scaridés, 23, 1865 (note on type).

2062. SCARUS CUZAMILÆ, Bean.

Depth 3⅓. D. IX, 10; A. III, 9; eye 7½ in head; scales 2–25–7. The body is somewhat fusiform in shape. The jaws are whitish at the margin and olivaceous over the rest of their surface; 3 canines, directed outwards and slightly backward on lower posterior edge of the upper jaw; upper lip covering rather less than ½ of the surface of the upper jaw; snout attenuated; a considerable depression above the nostrils; distance from tip of upper jaw to the iris, measured obliquely, equals ½ dorsal base and nearly ½ the head; eye situated rather less than 1 of its diameters from the upper profile of the head and nearly 3 of its diameters from the lower profile; 4 rows of scales on the cheek, besides a row of scales upon the suboperculum and interoperculum; lower series on cheek containing 5 scales and the other series from 6 to 7; 7 series of scales on the median line of the back before the dorsal. Height of body not equal to length of head. Least height of tail equals length of postorbital part of head and not quite ½ the greatest height of body; origin of dorsal about over that of the pectoral; base of dorsal exactly twice as long as that of anal; dorsal spines about equal in size, the fourth spine equals ⅙ the greatest height of body, and is contained 3 times in the distance from the tip of the upper lip to the origin of the dorsal; length of pectoral about ⅕ of total length to end of the middle caudal rays; ventral a little more than ½ as long as head. Lateral line interrupted under end of soft dorsal, 18 scales being pierced before the interruption. Colors of the alcohol specimen: Spinous dorsal with a narrow, dark margin; soft dorsal with a broad, dusky margin, the rest of the fin lighter; anal light at base, a faint, dusky band covering about the outer ⅔ of the fin; pectoral and ventral pale; caudal light at base, and with several broad, light areas extending out on the rays; the major portion of the fin, however, is very dark; general color dusky olivaceous, many of the scales having a rosy blotch at the base; operculum with a few irregular blotches of blue; iris yellowish. Length 330 mm. Cozumel Island, Yucatan. (Bean.) ("In allusion of the ancient name of the island" of Cozumel.)

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* The specimens from Jamaica, wrongly called *Pseudoscarus chloris* by Dr. Günther, are thus described: "Two series of scales on cheek and 2 scales on the lower limb of the preoperculum; the second series is composed of 4 scales; caudal rounded, with the lobes produced; 15 pectoral rays; teeth very small. Nearly uniform green; vertical fins edged with dark green; nape or opercles sometimes reddish."

Scarus cuzamilæ, BEAN, Bull. U. S. Fish Comm. 1888, 196, Cozumel (Type, No. 37128. Coll. Bean); JORDAN, Review Labroid Fishes, 684, 1890.

2063. SCARUS VETULA (Bloch & Schneider).

(MUDFISH; VIEJA; OLD WIFE.)

Cheek with 4 rows of scales; angles of caudal more or less salient; teeth quite small; snout moderate; 2 (rarely 3) lateral canines in upper jaw. General color dark sky blue; scales brown-edged; eye with blue spots above and behind; a green band from the angle of the mouth, bordered above and below by red; no pale lateral band; fins chiefly blue, darker on pectoral and front of caudal; middle of dorsal reddish, with blue spots; a red band near the edge of the caudal, 1 on the base of the anal, and 1 near the upper edge of the pectoral; ventrals mostly red, their external border blue; upper jaw with red and blue edgings. West Indies; generally common. One of the most gorgeous of the parrot-fishes, reaching a length of nearly 2 feet. The specimens here described were sent by Professor Poey to the museum at Cambridge. (*vetula*, old woman, given in allusion to the Spanish name *Vieja;* English name, *Old Wife.*)

Vieja, PARRA, Dif. Piezas, etc., 58, pl. 28, f. 1, 1787, Havana.

Scarus vetula, BLOCH & SCHNEIDER, Syst. Ichthyol., 289, 1801, Cuba, after PARRA; CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 193, 1839; GUICHENOT, Scaridés, 25, 1865 (note on type); JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 90; JORDAN, Review Labroid Fishes, 684, 1890.

Scarus superbus, POEY, Memorias, II, 218, 1860, Cuba.
Pseudoscarus superbus, GÜNTHER, Cat., IV, 218, 1862; POEY, Synopsis, 346, 1868; POEY, Enumeratio, 116, 1875.
Pseudoscarus vetula, GOODE, Bull. U. S. Nat. Mus., V, 32, 1876.

2064. SCARUS GNATHODUS, Poey.

Brown, with a clear brown band along middle of trunk and another along lower part of belly; posterior canines strong; edge of jaw strongly emarginate; posterior border of caudal flexuous. Cuba (Poey); not seen by us. This species may be, as Poey suspects, simply the normal form of *Scarus acutus*, the type of the latter having no canines. The coloration of the two is the same. (*γναθός*, jaw; *ὀδούς*, tooth.)

Scarus gnathodus, POEY, Repertorio, II, 240, 1867, Havana.
Pseudoscarus gnathodus, POEY, Synopsis, 350, 1868; POEY, Enumeratio, 119, 1875.

Subgenus CALLIODON (Gronow) Schneider.

2065. SCARUS CROICENSIS (Bloch).

(BULLON.)

Head 3 ($3\frac{5}{7}$ with caudal); depth 3 ($3\frac{5}{7}$). D. IX, 10; A. II, 9; eye small, $5\frac{1}{4}$ in head; snout not obtuse, $2\frac{3}{4}$; scales $2\frac{1}{2}$–24–6. Body comparatively elongate. No posterior canine teeth; lip covering most of surface of upper jaw; cheek with 3 rows of scales, the lower with 3 or 4 scales, those of the upper row scarcely larger than those of the second row; 7 scales on median line before dorsal; pectoral reaching just past tips of ventrals; origin of ventral spine slightly behind base of pectorals; tips of ventrals reaching slightly more than midway between base of fin and front of anal; caudal slightly and evenly rounded, its outer rays $1\frac{1}{2}$ in head, not at all produced in specimens examined. Color in life, of young of 2 to 4 inches, dark olive, little mottled, rosy below, on bases of scales and lower part of head; 2 dark, lateral, parallel stripes, the upper passing through eye and about equaling it in width, being twice as wide as lower stripe which meets base of pectoral; jaws reddish; teeth light reddish; dorsal orange yellow, its edge pale bluish; caudal and anal similar, the former mottled; ventrals red orange; pectorals plain, the base yellowish without dark blotch. In spirits the rosy color becomes grayish and all the fins pale. Older examples, 7 to 9 inches in length, are dark reddish brown above, paler below; back dark, sides with 2 dark parallel stripes of the color of the back, separated by pale interspaces, the upper one backward from eye; snout above bluish brown, a narrow whitish streak running from head along the middle line of belly; 3 similar streaks on each side of breast, there being 1 on each row of scales; teeth dark red; a dusky blotch at base of pectoral; caudal pale, orange red, dusky at tip and sides, the outer rays being somewhat barred with brown; anal light bluish, dusky, paler in front and on edge; ventrals and pectorals pale; dorsal orange, edged with bluish. Here described from a specimen from Havana, 7 inches in length. West Indies, north to Key West; generally common; 1 of the smaller species; taken by Dr. Jordan at Havana and Key West. Specimens from Bermuda, Tortugas, St. Thomas, and St. Croix examined by us. Poey recognizes *Pseudoscarus lineolatus*, with the 3 streaks along the side of the breast, as a species distinct from *P. sanctæ-crucis* (*croicensis*), in which these markings are obsolete. These stripes are present in all our specimens from Cuba and Florida, but in a larger example from St. Lucia they are very faint or obsolete. Their absence is probably a matter of age, not of specific difference. (*croicensis*, living in St. Croix, where the species was discovered.)

Callyodon, GRONOW, Museum Ichthyol., II, 8, 1763; GRONOW, Zoöphylaceum, 244, t. 7, f. 4 (*sine patria*).

Scarus croicensis, BLOCH, Ichthyol., pl. 221, 1790, St. Croix; probably more than 1 species included; JORDAN & GILBERT, Synopsis, 938, 1883; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 87; JORDAN, *l. c.*, 137; JORDAN, Proc. U. S. Nat. Mus. 1886, 47; BEAN, Bull. U. S. Fish Comm. 1888, 198; JORDAN, Review Labroid Fishes, 685, 1890.

Erychthys croicensis, SWAINSON, Nat. Hist. Class'n Fishes, II, 226, 1839 (name only).

Scarus insulæ-sanctæ-crucis, BLOCH & SCHNEIDER, Syst. Ichthyol., 285, 1801 (after BLOCH), St. Croix.

Calliodon lineatus, BLOCH & SCHNEIDER, Syst. Ichthyol., 312, pl. 62, f. 2, 1801 (after GRONOW); GRONOW, Syst. Nat., Ed. Gray, 84, 1854 (*sine patria*).

Scarus alternans, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 200, 1839, Martinique.

Pseudoscarus lineolatus, POEY, Repertorio, II, 239, 1868, Cuba; POEY, Enumeratio, 119, 1875.

Pseudoscarus sanctæ-crucis, GÜNTHER, Cat., IV, 226, 1862; GUICHENOT, Scaridés, Mus. Paris, 29, 1865; POEY, Synopsis, 350, 1868; POEY, Enumeratio, 119, 1875.

Scarus sanctæ-crucis, COPE, Trans. Am. Phil. Soc. 1870, 461.

2066. SCARUS EVERMANNI, Jordan.

Head $2\frac{5}{6}$ ($3\frac{1}{2}$ in total); depth $2\frac{5}{6}$. Teeth pale; no canines; caudal fin (mutilated) apparently subtruncate in life; scales on cheek in 2 rows. In life, bright green, olivaceous above, paler below; the lower half of the body becoming posteriorly more and more yellow, and on the lower half of the caudal peduncle bright light yellow; this color brightest above front of anal; a longitudinal band of bright crimson (fading to whitish in spirits) on body on level of eye, but narrower than eye and growing fainter behind; some crimson marks on the scales above this band forming a faint interrupted band below lateral line; both these bands continued on head to eye with a band of green (brown in spirits) between them; sides of belly each with 3 sharply defined lines of indigo black, like ink marks, each on a row of scales, these stripes running from the breast to beyond front of anal; no spot on base of pectoral; bright green on top of head above eyes, reddish below; caudal fin green, its lower half yellow; dorsal, anal, and pectorals (mutilated in the type), apparently all green, at least at base; ventrals yellow. In spirits, fading to brown, with 1 distinct pale lateral stripe on level of lower part of eye, and a fainter one above it. Blue-black streaks on sides of belly not fading in alcohol; a small dark spot on upper edge of caudal peduncle near base of caudal. Gulf of Mexico, in deep water, with *Scarus bollmani*. The type, 3 inches, was obtained from the stomach of a red grouper, off Tampa Bay, by Charles H. Bollman. Very close to *Scarus croicensis*, and similar to it in pattern of coloration, except that the sharply defined streaks on the sides of the breast are in *S. evermanni* inky blue, in *S. croicensis* whitish. (Named for Barton Warren Evermann.)

Scarus evermanni, JORDAN, Proc. U. S. Nat. Mus. 1886, 469, off Tampa Bay (Type, No. 37990. Coll. C. H. Bollman); JORDAN, Review Labroid Fishes, 685, 1890.

2067. SCARUS FLAVOMARGINATUS, Cuvier & Valenciennes.

Jaws trenchant, their crenulations little marked; no canines; 3 series of scales on the cheek; caudal squarely truncate, its outer rays not produced; body deeper than in *S. croicensis*, the snout more blunt. Color yellowish brown; no bands or lines upon body or head; dorsal spotted with violet; a yellow line near the edge, and another along the base of the dorsal; caudal unspotted. (Guichenot.) Martinique. Known only from the scanty descriptions of Valenciennes and Guichenot, taken from one young specimen. (*flavus*, yellow; *marginatus*, margined.)

Scarus flavomarginatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 202, 1839, Martinique (Coll. Plée); JORDAN, Review Labroid Fishes, 686, 1890.
Pseudoscarus flavomarginatus, GUICHENOT, Scaridés, 30, 1865 (note on type).

2068. SCARUS ACUTUS, Poey.

(LORO.)

Head rather slender; depth 3½ in length, equal to length of head; eye 7 in head in middle of its length; caudal subtruncate with salient angles; snout rather pointed; nostrils close together; no posterior canines; cheek with 4 rows of scales. Teeth whitish; general color violaceous; sides with a broad whitish band; fins plain reddish, the upper violaceous; upper lip deep blue, lower carmine; head olivaceous above, rosy below. Cuba (Poey); not seen by us. Perhaps identical with *Scarus gnathodus*, which seems to differ only in the presence of posterior canines; their absence in the types of *acutus* may be due to individual variations. (*acutus*, sharp-pointed.)

Scarus acutus, POEY, Memorias, II, 216, 1861, Havana; JORDAN, Review Labroid Fishes, 684, 1890.
Pseudoscarus acutus, POEY, Synopsis, 350, 1868; POEY, Enumeratio, 118, 1875.

2069. SCARUS CÆRULEUS (Bloch).

(BLUE PARROT-FISH; LORO; CLAMAGORE.)

Head 3⅛ (3⅚ with caudal); depth 3⅛ (3⅚). D. IX, 10; A. II, 9; scales 2½–24–6; eye small, 5⅔ in head; snout rather acute, 2⅘ in head. Body rather elongate, the form subelliptical in the young, becoming deep with age, a great fleshy hump on the forehead in old individuals. Jaws small, with smooth edges, whitish in the adult, rosy in the young; no posterior canine teeth; upper lip covering about ½ of upper jaw; cheek with 2 rows of scales, the scales of the upper row nearly twice as broad as those of the lower; below the lower part is a partial row of 2 scales; 6 scales on median line of back before dorsal. Pectoral not reaching past tips of ventrals; origin of ventral spine under posterior end of pectoral base; ventrals reaching midway between base of fins and front of anal; caudal slightly rounded;

when spread open its outer rays a little produced, $1\frac{2}{5}$ in head, in young of a foot in length, said to be much longer in adult. Adult deep uniform blue; partly grown specimens (from Havana) bright sky blue everywhere; some brown on upper scales; lower lip reddish brown, edged with blue; fins blue, with some brown; teeth pale reddish. Young (4 inches; Key West) light, livid blue gray, tinged with brownish on back, quite bluish below; yellowish olive on top of head, but no sharp markings anywhere except on fins; jaws rather bright flesh red, the snout bluish; teeth pale; dorsal edged with bright blue, below this dull orange, its base livid; caudal grayish, faintly banded with olive, its upper and lower edges bright blue; anal flesh color, edged with light blue, ventrals greenish-blue, fading on last rays; pectorals flesh color; axil light blue. Color in spirits, greenish olive above, pale below; dorsal dusky; caudal and anal grayish; fins otherwise pale.

Large examples from Jamaica have the following colors:

Body ultamarine blue; fins blue, dorsal edged with darker blue, the membrane of spinous dorsal blackish at base; a sky-blue band from eye to and across each lip; a pale band below it on under lip, a narrow pale edging above; pectoral with base and upper ray blue, rest of fin pale; anal deep blue, blackish at base; ventrals blue, the last rays paler; caudal deep blue, the outer rays darker, posterior edge pale; teeth pale. Specimens about 6 inches long have the back yellow, scales on sides yellow with green edges; belly nearly uniform greenish; outer rays of caudal deep green, middle rays paler; dorsal yellow, edged with green; anal pale yellowish, edged with green; pectorals nearly colorless, slightly orange at tip; ventrals greenish.

Length of example described from Havana, $10\frac{1}{2}$ inches. The species reaches a length of 2 or 3 feet. West Indies; generally common; straying northward along the coast of the United States; taken in abundance in pound nets off St. George Island, Maryland, about 12 miles from Chesapeake Bay, in August, 1894, some specimens weighing 12 pounds (Dr. Hugh M. Smith.)* Abundant about Key West and in the Bermudas. In the adult (*obtusus*) a great fleshy hump is developed on the forehead and the lobes of the caudal become much produced as in *Pseudoscarus guacamia*. (*cœruleus*, blue.)

Novacula cœrulea (the Bluefish), CATESBY, Nat. Hist. Carolina, etc., 18, pl. 18, 1743, Bahamas.

Loro, PARRA, Descr. Dif. Piezas Hist. Nat., 57, pl. 27, fig. 1, 1787, Cuba.

Trompa, PARRA, *l. c.*, fig. 2.

Coryphæna cœrulea, BLOCH, Ausländische Fische, II, 120, pl. 176, 1786, in part; after CATESBY and a figure of AUBRIET, altered from a figure by PLUMIER.

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* Dr. Smith writes as follows under date of October 13, 1894: "I am now able to furnish some additional data on the parrot-fish. I have interviewed 2 gentlemen who saw the fish when first taken, and now present their description of the colors: The back was very dark greenish blue, which color extended from the upper part of the beak to the base of the tail; this shaded off on the sides of the body to a light blue; the under parts, including the mandible, were white; the fins were very dark green or blue, almost black; these colors apply to a specimen weighing 8 pounds. Thinking that if these fish were found in the Potomac River they would also probably be taken in the Chesapeake, I wrote to a well-informed fisherman and fish dealer at Cape Charles City, Virginia, inclosing a figure of a parrot-fish and asking whether any had been caught this year. He replied that a few fish resembling the figure and my description were obtained in pound nets between Cape Charles and Hungers Creek in August and September. He learned of 6 to 10 of these 'new' fish taken from time to time, seldom more than 1 at a lift."

Scarus loro, Bloch & Schneider, Systema Ichthyol., 288, 1801; after *Loro* of Parra.

Scarus trilobatus, Lacépède, Hist. Nat. Poiss., IV, 21, 1803, Martinique; on a drawing by Plumier.

? *Scarus holocyaneos*, Lacépède, Hist. Nat. Poiss., IV, 45, 1803, Martinique; on a copy by Aubriet of a drawing of Plumier; the copy colored entirely blue in order to represent this species; the original drawing probably intended for *Sparisoma chrysopterum;* the same copy by Aubriet, the original of Bloch's engraving of *Scarus cæruleus.*

Scarus obtusus, Poey, Memorias, II. 217, 1860, Cuba; adult.

Scarus nuchalis, Poey, Memorias, II, 220, 1860, Cuba; young.

Pseudoscarus chloris, Günther, Cat., IV, 227, 1862; not *Scarus chloris* Bloch & Schneider.

Scarus cæruleus, Bloch & Schneider, Systema Ichthyol., 288, 1801: after Catesby, and *Trompa* of Parra; Cuvier & Valenciennes, Hist. Nat. Poiss.. XIV, 186, 1839; Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 85; Jordan, Proc. U. S Nat. Mus. 1884, 137, Jordan, *l. c.*, 1886, 48; Jordan, Review Labroid Fishes, 686, 1890.

Pseudoscarus cæruleus, Günther, Cat., IV, 227, 1862: Guichenot, Scaridés, Mus. Paris (Proc. Soc. Imp. Nat. Cherbourg), 1865, 24; Poey, Repertorio, I, 373, 1867; Poey, Synopsis, 348, 1868; Goode, Bull. U. S. Nat. Mus., V, 33, 1876.

Pseudoscarus nuchalis, Poey, Synopsis, 348; Poey, Enumeratio, 117.

Pseudoscarus obtusus, Poey. Synopsis, 349; Poey, Enumeratio, 117

2070. SCARUS EMBLEMATICUS, Jordan & Rutter.

Head 3; depth 3⅓; eye 4¾ in head. D. IX, 10; A. III, 9; scales 3–24–5. Dorsal and ventral outlines regularly and similarly curved, body highest over pectorals; nostril in front of eye, close together, very small, scarcely larger than some of the numerous pores which surround the eye, the anterior round, with a circular marginal valve, the posterior oblong, with a valve on lower side; eye 1⅔ in snout, low, a line drawn from corner of mouth to angle of opercle passing along lower edge of orbit; jaws projecting, the upper without canines; cheek with only 2 rows of scales; origin of dorsal and root of pectoral in the same vertical, which is anterior to tip of opercle; tips of last dorsal and anal rays reach base of rudimentary caudal rays; caudal truncate, slightly rounded when the fin is spread. Back dusky olive, a pale yellowish streak from upper side of eye to upper base of caudal, below this a band similar in color to the back extends from eye to caudal, sides below pale with an indistinct dusky streak from above pectoral to caudal; a horizontal green stripe from upper end of gill opening forward through upper edge of eye and across top of snout; another parallel with this from gill opening through lower edge of eye and around upper lip; lower lip white, edged with green, a green band across chin, and a pair of indistinct green blotches on throat; breast washed with green; base and edge of dorsal and anal green, a broad white stripe through the middle of each; upper and lower rays of caudal white, tipped with orange, edged on each side with green, the middle rays pale dusky green, paler at base; pectorals and ventrals white, the former not dusky at base; teeth white. This species is most nearly related to *Scarus cæruleus*, but differing decidedly in the color markings. The above description is based on a single specimen 6 inches long. Jamaica; only the type known. (*ἐμβλημᾰτικός*, banner-like.)

Scarus emblematicus, Jordan & Rutter, Fishes in Jamaica, in Proc. Ac. Nat. Sci. Phila. 1897, 122, Jamaica. (Type in L. S. Jr. Univ. Mus. Coll. J. S. Roberts.)

650. PSEUDOSCARUS, Bleeker.

(GUACAMAIAS.)

Pseudoscarus, BLEEKER, Versl. Akad. Wet. Amsterdam, Scaroiden, XII, 1861, 3 (*microrrhinos*).*

Loro, JORDAN & EVERMANN, Check-List Fishes, 418, 1896 (*guacamaia*).

This genus differs from *Scarus*, as here understood, chiefly in the deep green or blue color of its highly modified jaws and teeth. The species are mostly of large size and robust form. (*ψευδής*, false; *σκάρος*, *Scarus*.)

PSEUDOSCARUS:

a. Upper jaw with canines; caudal fin with angles much exserted, especially in the adult; soft dorsal and anal ending in points; 2½ rows of scales on cheek.

  b. Upper jaw usually with 1 posterior canine. Color bright blue, the edges of the scales brownish; fins dark brown, with green upon the external border of the ventrals, which are long and pointed; forehead with a fleshy hump in the adult.

    c. Tubes of the lateral line considerably branched. CŒLESTINUS, 2071.

    cc. Tubes of the lateral line not branched. SIMPLEX, 2072.

  bb. Upper jaw with from 3 to 6 posterior canines; jaws very convex. Color green under pectoral, and along the side and posterior part of the body; head, anterior and upper part of the back, and belly grayish yellow; dorsal and anal brown, spotted with green along their bases; pectorals and ventrals tinted with green; caudal grayish yellow. Size large. PLEIANUS, 2073.

LORO (*loro*, parrot):

aa. Upper jaw without posterior canines; teeth deep blue green. Size large.

  d. Caudal deeply notched, the angles much produced in the adult (the fin truncate or rounded in the young); body moderately elongate; depth 2½ to 3 in length; cheek with 2½ rows of scales, those of the upper row larger than those of the second, 1 scale below the second row. Color olive green, with more or less ill-defined green markings on head; lower parts more or less reddish; vertical fins brownish orange, all edged with deep blue. GUACAMAIA, 2074.

  dd. Caudal rounded, the angles not produced; body robust, the depth in adult 2⅕ in length; cheek with 2 rows of scales, the lower of 4, the upper of 5 scales; lower limb of preopercle wholly naked Color light brownish, with some greenish shading on sides and bluish green on caudal peduncle; fins all bright blue; snout and forehead bluish; orbits surrounded by radiating dots and dashes of green. PERRICO, 2075.

Subgenus PSEUDOSCARUS.

2071. PSEUDOSCARUS CŒLESTINUS (Cuvier & Valenciennes).

(LORO.)

Jaws large, their edges marked with strong denticulations, upper jaw blue on its edge only, lower almost entirely blue; upper jaw usually with 1 posterior canine; caudal fin with angles much exserted, especially in the adult; soft dorsal and anal ending in points; 2½ rows of scales on cheek; tubes of the lateral line very much branched. Color bright blue, the edges of the scales brownish; fins dark brown, with green upon the external border of the ventrals, which are long and pointed; forehead with a fleshy hump in the adult. West Indies; probably not rare, reaching a large size; recorded by Poey from Havana, and from St. Thomas by Plée; known to us only from the examination of the original type, a dried skin in the museum at Paris. (*cœlestinus*, heavenly (blue).)

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* *Pseudoscarus microrrhinos*, the first species mentioned by Bleeker under *Pseudoscarus*, must, in accordance with Bleeker's custom, be regarded as the type of the genus.

Scarus cœlestinus,* CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 180, 1839, St. Thomas; JORDAN, Proc. U. S. Nat. Mus. 1886, 543 (note on original type); JORDAN, Review Labroid Fishes, 687, 1890.

Pseudoscarus cœlestinus, GUICHENOT, Scaridés, 22, 1865 (note on type); POEY, Synopsis, 349, 1868; POEY, Enumeratio, 118, 1875.

2072. PSEUDOSCARUS SIMPLEX, Poey.

Snout pointed; jaws large, blue, with coarse crenulations; tubes of the lateral line without branches. Color entirely blue. Length 3 feet. Cuba. (Poey); not seen by us; apparently differing from *Pseudoscarus cœlestinus* only in the simple tubes of the lateral line. (*simplex*, simple.)

Pseudoscarus simplex, POEY, Repertorio, I, 185, 1867, Havana; POEY, Synopsis, 349, 1868; POEY, Enumeratio, 118, 1875.

Scarus simplex, JORDAN, Review Labroid Fishes, 687, 1890.

2073. PSEUDOSCARUS PLEIANUS (Poey).

Body oblong oval; jaws large, very convex, the crenulations large and round; upper part of the jaws blue; upper jaw with from 3 to 6 posterior canines (3 on one side in type, 5 or 6 on the other); cheek with 2½ rows of scales. Color red, shaded with blue and green; green under pectoral, and along the side and posterior part of the body; head, anterior and upper part of the back, and belly grayish yellow; dorsal and anal brown, spotted with green along their bases; pectorals and ventrals tinted with green; caudal grayish yellow. Size large. St. Thomas. Only the type, a very large dried skin, known; not seen by us. It is evident that *Scarus guacamaia* Cuvier & Valenciennes, the "Grand Scare aux machiores bleus," with 3 to 6 posterior canines, can not be the original *Scarus guacamaia* of Cuvier, which has no canines at all. No writer has examined any other specimens referable to the *guacamaia* of Valenciennes, but Poey has given to these descriptions the name *Scarus pleianus*, which the species must keep if it be really valid. (Named for M. Plée, who collected for Cuvier in the West Indies.)

Scarus guacamaia, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 178. 1839, St. Thomas. (Coll. Plée.)

Pseudoscarus guacamaia, GUICHENOT, Scaridés, 21, 1865 (note on type); not *Scarus guacamaia*, CUVIER.

Scarus pleianus, POEY, Memorias, II, 393, 1861, St. Thomas; based on *Scarus guacamaia*, CUVIER & VALENCIENNES; JORDAN, Review Labroid Fishes, 687, 1890.

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*We have the following note on the type of *Scarus cœlestinus:* "A large stuffed skin, 0.60 m. long, from St. Thomas. (Plée.) Color now plain dusky (perhaps blue in life); teeth apparently dark green; forehead fat; a single canine on right side of upper jaw, none on left; cheek with 2½ rows of scales; 7 scales before dorsal; caudal rounded, but with the outer rays much produced, about ⅓ their length being exserted; next the last rays of dorsal and anal similarly prolonged into a point; ventrals long, pointed; form rather robust; head 3⅖; depth 3⅙."

Subgenus LORO, Jordan & Evermann.

2074. PSEUDOSCARUS GUACAMAIA (Cuvier).

(GUACAMAIA; GREEN PARROT-FISH.)

Head 3 to $3\frac{4}{7}$ in length to base of caudal; depth $2\frac{3}{4}$ to $3\frac{2}{5}$; eye small, 6 in head; snout not very obtuse, $2\frac{2}{3}$ in head. D. IX, 10; A. II, 9; scales $2\frac{1}{2}$–24–6. Body moderately elongate; no canine teeth; upper lip covering more than $\frac{1}{2}$ of surface of upper jaw. Cheek with 2 rows of scales of 5 or 6 in each row, those of the upper row nearly twice as broad as those of the lower; a single scale below the lower row; 6 or 7 scales on median line before dorsal. Pectorals reaching just past tips of ventrals; origin of ventral spine below the middle of pectoral base; caudal rounded when spread open, its angles slightly produced, its outer rays (in specimens 8 inches long) $\frac{1}{2}$ in head. In adults the outer rays are longer in proportion, and in very old examples, none of which has been seen by us, they are said to be greatly produced. Color in life, of specimens of moderate size, olive green, each scale edged with clear brown, its middle, especially above, bright verdigris green; sides of head brownish gray; belly white, tinged with brown; a bright green stripe from eye around snout, another from eye to eye above, another undulating stripe below eye; several green spots and dashes behind eye; upper lip reddish; jaws deep bluish green, the color not fading in spirits; teeth deep greenish blue; vertical fins all brownish red, verging on orange above, their edges, including sides and tips of caudal, all bright greenish blue; ventral flesh color, tinged with orange, its anterior edge greenish blue; pectoral very pale reddish, the first and last rays light blue; a greenish dot at the base of each membrane of dorsal and anal; axil reddish. Older individuals similar in color, but with the head more pinkish and its markings more diffuse. In spirits, the green stripes and spots on head become fainter and the red of upper lip and axil and the orange of fins fade. Length of the example here described from Key West, $7\frac{1}{2}$ inches. The species reaches a length of 2 or 3 feet. West Indies, north to the Florida Keys, south to Rio de Janeiro; everywhere common. This species is abundant about rocks at Key West, and is also not uncommon in the Havana market, where it is known still as *Guacamaia*. Our fish is certainly the *Guacamaia* of Parra, on which, as the printed record shows, the *Scarus guacamaia* of Cuvier was based. The specimen in Cuvier's possession, afterwards described by Valenciennes under the name *Scarus guacamaia*, has canines in the upper jaw, and must belong to a distinct and (to us) unknown species, to which Poey has given the name *Scarus pleianus*. We have seen no specimens a yard in length, as mentioned by Parra, nor have we seen any with the caudal lobes prolonged to the extent shown in his figures. None of our specimens, young or old, show traces of canines. We have examined the type of *Scarus turchesius** in Paris. It seems to be the same as *Pseudoscarus guacamaia*.

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* The type of *Scarus turchesius* is thus described by Guichenot: "Form of *Pseudoscarus cœlestinus:* Jaws finely crenulate on the edge, otherwise smooth; no posterior canines; 2 rows of scales on cheeks; caudal rounded, its angles little produced. Color dark green, paler on sides, rosy below; green areas on membranes of dorsal, of which the edge is

Poey's *Scarus rostratus* * seems to be based on young examples with rather sharper snout than usual. (*guacamaia*, Spanish name of a large parrot with very thick jaws.)

Guacamaia, PARRA, Descr. Dif. Piezas Hist. Nat., p. 54, pl. 26, 1787, Cuba.
Scarus guacamaia. CUVIER, Règne Animal, Ed. II, Vol. 2, 265, 1829; no description; based on PARRA; not *Scarus guacamaia*, CUVIER & VALENCIENNES = *Scarus pleianus*, POEY; JORDAN & GILBERT, Synopsis, 938, 1883; BEAN, Bull. U. S. Fish Com. 1888, 198.
Scarus turchesius, CUVIER & VALENCIENNES, Hist. Nat. Poiss., XIV, 181. 1839, Porto Rico; GUICHENOT, Scaridés, 23, 1865 (note on type); JORDAN, Proc. U. S. Nat. Mus. 1886, 543; note on original type.
Scarus rostratus, POEY, Memorias, II, 221, 1860, Havana.
Pseudoscarus rostratus, POEY, Synopsis, 349, 1868; POEY, Enumeratio, 118, 1875.
Pseudoscarus turchesius, POEY, Repertorio I, 317, 1861; POEY, Synopsis, 348, 1868; POEY, Fauna Puerto Riqueña, 337. 1875.
Pseudoscarus guacamaia, GÜNTHER, Cat., IV, 233; POEY, Synopsis, 348, 463, 1868.
Hemistoma guacamaia, JORDAN & GILBERT, Synopsis, 607. 1883.
Scarus guacamaia, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 84; JORDAN, *l. c.*, 137; JORDAN, Proc. U. S. Nat. Mus. 1886, 48; JORDAN, Review Labroid Fishes, 688, 1890.

2075. PSEUDOSCARUS PERRICO (Jordan & Gilbert).

(PERRICO.)

Head 3 in length: depth 2⅕. D. IX, 10; A. II, 9; scales 24. Body robust, deep, compressed; top of head with a large adipose hump. No pointed teeth at angle of mouth; upper lip covering about ½ the surface of the upper dentary plate; lower lip covering base only of lower dentary plate. Cheek with 2 rows of scales, the lower of 4, the upper of 5; lower limb of preopercle wholly naked. Caudal fin somewhat rounded, its lobes not produced; pectoral fin ¾ length of head, reaching to tips of ventrals; ventrals inserted under front of pectorals. Coloration in life, light brownish, with some greenish shadings on sides and bluish green on caudal peduncle; fins all bright blue; snout and forehead bluish; orbits surrounded by radiating dots and dashes of green; teeth green. In spirits, a yellowish area below and in front of eye; upper edge of dorsal and lower edges of caudal, anal, and ventrals yellowish, as is the lower side of the head. Pacific coast of Mexico; known from Mazatlan, La Paz, and the Venados Islands. A large species common in the rocks about Mazatlan. It is seldom caught, and is not eaten. The type here described is 23 inches in length. It is remarkable that this single species and *Calotomus xenodon* are the only Scaroid fishes yet described from the eastern Pacific. (*perrico*, a Spanish word for parrot).

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dark green or blue, as is that of anal and that of caudal between the points; pectorals and ventrals yellow, the latter tinged with green toward the edges. Type, a dried skin, not fully grown, from Porto Rico."

On the same specimen examined by us in Paris we have the following note: "*Scarus turchesius*. (Cuv. & Val., XIV, 181.) A dried skin, 0.40 m. long, from Porto Rico. (Plée.) Color faded to a plain brown, paler than in *S. cœlestinus*; no canines. Forehead not very fleshy (young); caudal with its lobes exserted for ¼ to ⅕ their length; dorsal, anal, and ventrals less produced than in the type of *Scarus cœlestinus*; scales on cheek in 2 rows; head 3⅗ in length; depth 3⅕; teeth faded, but still partly green."

* Poey describes *Pseudoscarus rostratus* as brownish blue, with ultramarine blue on the head and margins of dorsal, anal, and ventral; teeth blue, size rather small. According to him *Pseudoscarus turchesius* differs from *P. rostratus* in having the jaws less terminal and the head uniformly colored; posterior part of caudal bordered with blue, as is the dorsal and anal.

Scarus perrico, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 357, Mazatlan (Type, No. 28328. Coll. C. H. Gilbert); JORDAN, Review Labroid Fishes, 688, 1890.
Scarus perrico, JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 483.

Group ZEOIDEA.

This group contains the single family *Zeidæ*. Its relationships are uncertain, the armature and the increased number of the ventral rays indicating relationship to the *Berycidæ*, while the attachment of the post-temporal to the skull suggests affinity with the *Teuthididæ*.

Family CLXII. ZEIDÆ.

(THE JOHN DORIES.)

Body short, deep, much compressed and elevated, naked or covered with minute smooth scales, or with bony protuberances. Mouth large, terminal, the upper jaw protractile. Teeth small, in narrow bands or single series on the jaws and vomer and sometimes on the palatines. Eyes lateral, placed high; opercle much reduced; some of the bones of head usually with spines; preopercle not serrate. Post-temporal very firmly attached to the skull; lower limb adnate for its whole length; the distal end only of its upper limb is attached. The supra-clavicle short and triangular, bearing a short spine near its anterior angle, its posterior edge divided into 3 spines, 2 or 3 of which stand out above the surface of the skin. Ventral edge often serrate, with strong bony plates. Lateral line well developed, concurrent with the back. Branchiostegals 7 or 8. Gill openings wide, the membranes little united, free from the isthmus. Pseudobranchiæ large. Air bladder large. Gill rakers usually short; gills 4, a slit behind the fourth. Dorsal fin emarginate or divided, the anterior part with spines, which are often strong, the posterior part longer, its highest rays behind the middle; soft anal entirely similar to soft dorsal, usually preceded by 1 to 4 spines which are not graduated and which often form a separate fin; ventral fins thoracic, well developed, their rays usually I, 6 to I, 8;* pectorals small; caudal fin rounded, on a moderate peduncle. Lateral line obscure, unarmed. Pyloric cæca exceedingly numerous. Vertebræ about 32 (*Zeus*). Genera 8; species about 15; fishes of singular appearance, inhabiting warm seas, often at considerable depth. The species undergo great changes in the course of development. The "John Dory" (*Zeus faber*) is a well-known food-fish of southern Europe. The relations of this family are not evident, and it should form a distinct group or superfamily. The increased number of ventral rays and the armature of the belly suggest relationship with the Berycoids; the adnate post-temporal suggests the Chætodonts. Not having any better arrangement to suggest, we leave the *Zeidæ* in association with the *Chætodontidæ*, removing them from the neighborhood of the Scombroid forms, to which they bear only the most superficial resem-

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*Said to be I, 5 in *Oreosoma*, which may be an error in counting.

blance. (*Scombridæ*, group *Cyttina*, Günther, Cat., II, 393–396, 1860; *Cyttidæ*, Günther, Intr. Study Fish., 450, 1884.)

ZEINÆ:

a. Dorsal spines very strong, more or less filamentous; anal spines 3 or 4. Bony spinous plates present along bases of vertical fins and between ventrals and anal.
  b. Anal spines 3; both dorsals with strong bony spinous plates at base; ventral rays I, 6 or I, 7. ZENOPSIS, 651.

CYTTINÆ:

aa. Dorsal spines low; anal spines 1 or 2; vertical plates little developed.
  c. Body without large bony plates or warts, the skin covered with small scales; base of dorsal and anal with bony plates. ZENION, 652.
  cc. Body with large conical bony protuberances, 2 on each side of the back and many on the belly. OREOSOMA, 653.

651. ZENOPSIS, Gill.

Zenopsis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 126 (*nebulosus*).

Body ovate, much compressed, without scales, and without warts or humps in the adult. Head deeper than long, its anterior profile steep. Mouth rather large, upper jaw protractile; teeth small on jaws and vomer, none on the palatines. Various bones of the head and shoulder girdle armed with spines. Series of bony plates along the sides of the belly and the bases of both dorsal and anal, each plate armed with a strong spine. Eye large, placed high. Gill rakers short. Dorsal spines very strong, usually 10 in number, some of them filamentous; anal spines 3; ventral fins long, the rays I, 6 or I, 7. Caudal peduncle slender, the fin not forked. Three species known, differing from the European genus *Zeus*,* mainly in the presence of 3 anal spines instead of 4, and in the greater development of the spinous armature. Pelagic. (ζήν, *zeus*; ὄψις, appearance. *Zeus* is from Ζεύς, Jupiter.)

2076. ZENOPSIS OCELLATUS (Storer).

Head $2\frac{4}{5}$; depth $1\frac{3}{4}$. D. IX, 26; A. III, 24. Body short, deep, compressed. Skin wholly naked, except for the bony bucklers, which are armed each with a central spine hooked backward and marked with radiating ridges; 7 bucklers along the base of the dorsal, the fifth and sixth largest; 2 on the median line in front of the ventrals, the second largest; 1 median plate, 6 pairs between ventrals and anal, and 4 along the base of the anal. Top of the head with roughish ridges, but without spines; a spine at the base of each dentary bone; the broad maxillaries each with a supplemental bone; teeth nearly obsolete. Eye large, much nearer gill opening than tip of snout. Gill rakers short. Caudal peduncle very slender, caudal fin short and rounded; pectorals very short; ventrals large, the rays I, 6, the first soft ray closely appressed to the spine; anal spines short and stout, the soft rays, like those of the dorsal, low; dorsal spines filamentous. Color silvery, nearly plain; a black lateral ocellated spot in life, disappearing in spirits. Pelagic; 1 specimen known, taken off Provincetown, Massachusetts. Description from the original type in the museum of the Boston Society of Natural History. (*ocellatus*, ocellate.)

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* The European genus, *Zeus*, containing the common "John Dory," *Zeus faber*, a well-known food-fish in the Mediterranean, has not been found in American waters.

Zeus ocellatus, STORER, Proc. Bost. Soc. Nat. Hist., VI, 1858, 386, Provincetown, on Cape Cod.

Zenopsis ocellatus, JORDAN & GILBERT, Synopsis, 456, 1883; GOODE & BEAN, Oceanic Ichth., 224 with plate, 1896.

652. ZENION, Jordan & Evermann.

Zenion, JORDAN & EVERMANN, Check-List Fishes, 418, 1896 (*hololepis*).

Body compressed and elevated, covered with very small scales; mouth protractile. Dorsal fins contiguous, the first with 6 or 7 low spines; a short spine before the anal; bony plates present along the bases of the dorsal and anal fins. As in *Zeus*, ventral fins composed each of 1 spine and 6 soft rays, not depressible in a groove. Very minute teeth in the jaws and on the vomer, none on the palatine bones. Branchiostegals 8. Deep seas. The single species described below seems to be the type of a distinct genus, differing from the Australian genus *Cyttus* in the absence of ventral groove and in the presence of bony plates along dorsal and anal. (A diminutive of *Zeus*, *ζεύς*, the John Dory.)

2077. ZENION HOLOLEPIS (Goode & Bean).

Head 2⅔; depth 2½. D. VI or VII, 26; A. 23; V. I, 6; P. 16. Eye very large, 4½ in body or nearly 2 in head; interorbital width 2½. Premaxillaries protractile and, when drawn out, a deep horseshoe-shaped groove is exposed between the orbits; premaxillary 2 in head without snout; maxillary thin, broad, obtuse at the extremity, its length equaling that of interorbital area; length of mandible nearly ½ that of head; mouth almost vertical when closed. Quadrate bone ending posteriorly in a broad, obtuse spine, and with several ridges with minute cirri; supraorbital also with several minutely cirrated ridges. Teeth in jaws indistinguishable, except to the touch. Nostrils placed close to front of eye somewhat above its middle, the posterior, which is much the larger, a pear-shaped slit about 3 times as long as anterior. Pseudobranchiæ well developed; 14 or 15 very small lanceolate gill rakers below the angle. Gill openings very wide, the membranes very deeply cleft and only narrowly attached to the isthmus in front. Branchiostegals 8. Dorsal and ventral origins in the same vertical; distance of the spinous dorsal from snout equaling greatest height of body; spinous dorsal of 6 or 7 spines, the first of which is minute, about ¼ as long as second, which is as long as eye; second spine finely serrated in the middle of its anterior margin and dilated at the root so as to partly conceal base of third spine; rays of soft dorsal increasing in size backward, the first being only ⅓ as long as last, which is about ¼ as long as head, the longest rays about the nineteenth to the twenty-fourth, these are slightly longer than the last; caudal almost truncate or very slightly rounded when expanded, the middle rays nearly as long as eye; vent under fifth ray of second dorsal; anal origin under sixth ray; anal rays increasing in size backward, the longest not more than ¾ as long as those of dorsal; rays of soft dorsal and anal all simple and articulated; length of ventral spine ¼ of body, exceeding that of the longest soft ray; ventral, when fully expanded, subtriangular, the spine minutely serrated on its anterior margin; pectoral subcircular when expanded and composed entirely of simple articulated rays, the longest, in middle of fin, ½ as long as eye. About 10 rows of scales between the lateral line and base of spinous dorsal, and about 67 in lateral line. Plates at base of dorsal and anal well developed. Length 3 to 3½ inches. The type specimen was taken by the *Albatross* at Station 2358 in 220 fathoms, off Yucatan; 2 other specimens, No. 39297, from *Albatross* Station 2655, on Little Bahama Bank, in 338 fathoms. (Goode & Bean.) (ὅλος, whole; λεπίς, scale.)

Cyttus hololepis, GOODE & BEAN, Oceanic Ichthyology, 225, figs. 233, 233a, and 233b, 1896, off Yucatan and Little Bahama Bank. (Type, No. 39296. Coll. *Albatross*.)

653. OREOSOMA, Cuvier & Valenciennes.

Oreosoma, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 515, 1830 (*atlanticum*).

Body elevated and compressed, scaleless, rough or warty, and provided with several large, deciduous, conical, bony protuberances symmetrically arranged, the surface "resembling a relief map of a volcanic country," about 4 of these on the back and 20 below; posterior part of body without cones; no bony plates at base of dorsal and anal. Head without serrations; a small horn above each eye; opercle small; preopercle with 2 ridges. Mouth oblique, the lower jaw projecting. Villiform teeth on jaws, vomer, and palatines. Dorsal spines low and small, partially hidden by the humps. Soft dorsal and anal similar, rounded in outline. Pectorals short, rounded. Caudal rounded, on a slender peduncle under pectorals. Ventrals * well developed, thoracic. One species, scarcely known, probably belonging to the *Zeidæ* but its relationship uncertain. It may very likely be a larva of the species called *Cyttopsis roseus* (Lowe), or of some other species of *Cyttopsis* or of *Cyttus*. (ὄρος, hill; σῶμα, body.)

2078. OREOSOMA ATLANTICUM, Cuvier & Valenciennes.

Head nearly 3; depth about equal to length of body. B. 7; D. V, 29; A. 26; V. I, 5; C. 14. Profile straight, nearly horizontal; mouth nearly vertical; forehead broad between eyes, above each of which is a small conical horn; suborbitals and preopercle entire; opercle small; tail and region between dorsal and anal closely compressed and unarmed; trunk much thicker, with 2 great conical warts on each side above, and about a dozen on each side below, 4 on the median line; these dermal cones are readily detached, and are marked by concentric rings parallel with their base. Spinous dorsal inconspicuous, hidden by the cones; pectorals short;

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* According to Cuvier & Valenciennes, the ventrals "ont le nombre ordinaire de I, 5." But we may doubt if this number is accurately counted.

ventrals long; middle rays of dorsal and anal longest. Color grayish. Open Atlantic. Known from a single specimen, 1½ inches long. (Cuvier & Valenciennes.)

Oreosoma atlanticum, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 515, 1829, open Atlantic; GÜNTHER, Cat. Fishes, I. 214, and II, 396; GOODE & BEAN, Oceanic Ichth., 228.
Oreosoma coniferum, CUVIER & VALENCIENNES, *l. c.*, pl. 99; same type; a slip arising from uncorrected proof sheets.

Group CAPROIDEA.

A group of doubtful affinities, containing the single family *Caproidæ*. It has the ventral fins normal, the post-temporal adnate to the skull, and is, in many respects, similar to the *Squamipinnes*.

Family CLXIII. CAPROIDÆ.*

(THE BOAR-FISHES.)

Body compressed and elevated, covered with small, ctenoid scales; sides of head scaly; preorbital and preopercle more or less serrate or armed; opercle small; gills normal; gill membranes separate, free from isthmus; top of head bony; premaxillaries very protractile, the posterior process very long; mouth moderate, the lower jaw projecting, the teeth very small; lateral line not extending on caudal; dorsal fin long, the stout spines separated from the soft rays by a deep notch; dorsal spines not graduated; anal fin with 3 spines separated by a notch from the soft rays, the first spine longest; soft part of anal as long as soft dorsal; ventrals I, 5, the spine strong, inserted below pectorals; caudal fin rounded, on a moderate peduncle. Upper limb of the post-temporal widened at its distal end, which affords a very firm attachment; the lower limb short and thick. The supra-clavicle long and slender, its posterior edge sharply serrate, the serrations standing out above the surface of the skin. Vertebræ in normal number, $10 + 13 = 23$ (in *Capros*). Two or 3 species, arranged in 2 genera, and living in rather deep water. *Capros aper*, the Boarfish, superficially resembles the John Dory, *Zeus faber*, and is common on the coasts of southern Europe. This family, like the preceding, is of doubtful affinities. It is only remotely allied to the *Zeidæ*, and its relationship to the *Carangidæ* or other Scombroid forms is not evident. *Antigonia* bears much superficial resemblance to the *Ephippidæ*, a resemblance probably arising from real affinity, as is shown by the form and attachment of the post-temporal. An extinct genus, *Proantigonia*, is said to connect *Antigonia* with *Capros*. (*Capridæ*, Lowe, Fishes of Madeira, 1843, XII.)

ANTIGONIINÆ:
- *a.* Lateral line complete. Body deeper than long, covered with rough scales.
  - *b.* Teeth slender, in jaws only; anal spines strong. ANTIGONIA, 654.

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* Called *Caproidæ* by Dr. Gill to distinguish the group from *Capridæ*, the family of *Capra*, the goat.

654. ANTIGONIA, Lowe.

Antigonia, LOWE, Proc. Zoöl. Soc. Lond. 1843, 85 (*capros*).
Caprophonus, MÜLLER & TROSCHEL, Horæ Ichthyologicæ, III, 28, 1845 (*aurora*).
Hypsinotus, SCHLEGEL, Fauna Japonica, Poiss., XLII, 84, fig. 2, 1847 (*rubescens*).

Body very deep, the depth much greater than length of body, which is excessively compressed and covered with moderate-sized, firm, rough-ctenoid scales; profile from nape to dorsal very steep and nearly straight. Surface of head above with rough bony striæ; preopercle and suborbital bones armed with slender antrorse spines; mouth small, its cleft nearly vertical; premaxillary with a very long process, so that it is extremely protractile, perhaps less so than in *Capros;* lower jaw projecting; upper jaw somewhat protractile; maxillary broad, scaly; small, very slender teeth on jaws in 1 row, none on palate; chin rough; preopercle with rough striæ, becoming antrorse spines below; cheeks deep, covered with rough scales; opercle short, scaly. Branchiostegals 6; gill membranes separate, free from isthmus. Lateral line concurrent with the back. Fin spines stiff and strong. Dorsals united, the third spine stout and elevated, the sixth or last spine shortest, lower than the soft rays, the fin is thus distinctly notched. Soft dorsal and anal similar, long and low, none of the rays produced; anal spines 3, joined to the fin, the first longest. Base of dorsal and anal with a sheath of small, rough scales extending on the fin spines and slightly on the rays, not on the membranes; caudal peduncle short and deep, deeper than long; caudal short, squarely truncate; ventrals strong, of moderate length, at lowest point of ventral outline, well behind pectorals and directly below spinous dorsal, which is at highest point of dorsal outline; ventral spine large, roughened anteriorly; pectorals moderate, not falcate. Probably a single species, widely distributed. A very singular fish of uncertain relations. It is placed by Günther among the *Carangidæ* with *Platax, Psettus, Psenes, Zanclus,* etc., the natural character of the family being destroyed by the intrusion of these diverse forms. We see no real resemblance between *Antigonia* and any of the *Carangidæ*, nor does it seem to us to possess Scombroid affinities at all. It seems to be related to *Capros,* as Steindachner and Gill have indicated, in placing *Antigonia* among the *Caproidæ.* The union of the post temporal with the skull in *Capros* suggests affinity with *Zanclus* and *Chætodon,* a suggestion borne out by the long pubic bones. In its fin armature, scales, and roughness of head, *Antigonia* suggests *Priacanthus,* to which genus it may be possibly related. *Capros* shows some external resemblance to *Zeus,* but the systematic position of *Zeus* is equally uncertain. Nothing but its small, smooth scales allies *Zeus* to the Scombroids and its singular ventrals suggest the Berycoids. *Zeus* has 32 vertebræ, and the pubic bones not elongate. (*Αντιγόνεια,* a city founded by Antigonus, the allusion not evident.)

2079. ANTIGONIA CAPROS, Lowe.

(Shi shidai.)

Head 3; depth (greater with age) always more than length of body; eye 2½ in head; snout 3¾. D. VIII, 36; A. III, 33; V. I, 5; P. 13; C. 12; scales 15–59–40. Anterior profile of head steep, but growing steeper from the nape to first dorsal, so that it is concave above eye; base of dorsal forming a steep oblique line, corresponding to anterior profile; base of anal and outline of breast also very oblique; maxillary reaching front of eye; 3 or 4 rows of scales on cheek; prickles on chin; preorbital and other bones of head longer and more numerous in males; top of head covered with rough serrate striæ; third dorsal spine strong, rough, and curved, 1⅓ in head; first anal spine about as long as eye, 2¼ to 2⅔ in head; ventral spine 1½; caudal 1½. Scales very rough, much as in *Priacanthus.* Lateral line complete, concurrent with back. Air bladder large. Color golden red. Length about a foot. In rather deep water, widely distributed in the Atlantic, and also in the Pacific about Japan and the Ki Islands, and Manado, if the Pacific species, *Antigonia rubescens,* proves to be identical with *A. capros,* as is supposed. It lives in about 100 fathoms. (Steindachner; specimens from Tokio.) (*Capros,* a related genus, from *κάπρος,* a grunting sea-fish.)

Antigonia capros, Lowe, Proc. Zoöl. Soc. London 1843, 85, Madeira.

Caprophonus aurora, Müller & Troschel, Horæ Ichthyologicæ, III, p. 28, pl. 5, fig. 1, 1845, Barbados.

Hypsinotus rubescens, Schlegel, Fauna Japonica, Poissons, 84, pl. 42, fig. 2, 1847, Omura, Japan.

Antigonia mülleri, Klünzinger, Sitzb. Akad. Wiss. Wien., LXXX, 1879, 380, pl. 6, fig. 3, King George's Sound.

Antigonia capros, Goode & Bean, Oceanic Ichthyology, 229, fig. 235, 1896.

Suborder SQUAMIPINNES.

(The Scaly-fins.)

Body compressed, covered with small or minute ctenoid scales; lateral line unarmed, concurrent with the back; mouth small, with slender or brush-like teeth; opercles armed or not; nostrils double; gills 4, a slit behind the fourth; gill membranes united to the broad scaly isthmus; pseudobranchiæ present; air bladder present; dorsal fin long, the spines usually well developed, the soft part usually more or less scaly; caudal usually truncate or double concave; anal similar to soft dorsal; ventrals thoracic, sometimes rudimentary, sometimes with 2 spines, the pubic bone becoming progressively elongate; vertebræ usually 10+14=24, but sometimes still further reduced. Basis of cranium double, with a double muscular tube; post-temporal trifurcate or bifurcate in *Ephippidæ* and other transitional forms, as in the Scombroids and Percoids; in other species firmly united to the skull, its structure showing the usual 3 forks, the space between them filled in by bone, so that only a foramen is left; second, third, and fourth upper pharyngeals small, usually reduced to vertical transverse laminæ. Hypercoracoid with median foramen; pectoral with 4 short basal bones. This group comprises a large number of fishes, some of them showing analogies with the *Carangidæ* on the one hand and with certain Percoid fishes on the other; the typical forms specialized in directions leading toward the *Plectognathi*. The limits of the group are uncertain, although there is no doubt about the relationship of any of the genera here treated. Perhaps several of the families currently recognized as Scombroid belong here. From the *Squamipinnes* the *Plectognathi* are certainly descended. The close relation of *Balistes* to *Teuthis* admits of no doubt. This relationship is shown in the osteology, the reduced post-temporal and coalesced bones of jaws, in the great development of the pubic bone, in the restriction of the gill openings, and in the character of the scales, especially the armature of the tail. In a natural system the *Balistidæ* would follow the *Teuthididæ* and *Siganidæ*. The *Teuthididæ* and the *Balistidæ* are as nearly related to each other as the *Ephippidæ* are to the *Chætodontidæ*. (*squama*, scale; *pinna*, fin. The group is called *Epelasmia* by Cope, but the name *Squamipinnes* is older, and the *Chætodontidæ* are the chief constituents of both groups.

FAMILIES OF SQUAMIPINNES.

- *a.* Post-temporal bifurcate or trifurcate, not united with the skull; dorsal fins 2; separate teeth slender, hardly brush-like; maxillary distinct. EPHIPPIDÆ, CLXIV.
- *aa.* Post-temporal apparently simple, firmly united to the skull, dorsal fin continuous; ventral rays I, 5.
  - *b.* Teeth brush-like, setiform, thick set; post-temporal with a foramen which is usually fully perforate; carnivorous fishes with the intestinal canal short; the caudal peduncle unarmed and the pubic bone not greatly developed; maxillary distinct.
    - *c.* Scales well developed. CHÆTODONTIDÆ, CLXV.
    - *cc.* Scales reduced to minute asperities; some of the dorsal spines filamentous. ZANCLIDÆ, CLXVI.
  - *bb.* Teeth incisor-like, in a single series; post-temporal with a foramen which does not pass through the bone; scales minute, rough; herbivorous fishes with the intestinal canal elongate; the caudal peduncle usually armed with spines or tubercles; maxillary and premaxillary immovably united; post-temporal united with skull; pubic bones very long, bent, firmly attached to each other. TEUTHIDIDÆ, CLXVII.

Family CLXIV. EPHIPPIDÆ.

(THE SPADE-FISHES.)

Body compressed, usually greatly elevated, the anterior profile steep, the caudal peduncle short. Scales moderate or small, ctenoid, densely covering the soft parts of the vertical fins; lateral line present, following the curve of the back. Mouth small, terminal, horizontal; premaxillaries slightly protractile; maxillary short, without supplemental bone, partly slipping under the narrow preorbital; jaws with bands of slender, pointed, movable, brush-like teeth; nostrils double; preopercle very finely serrated or entire; gill membranes broadly attached to isthmus, the openings restricted to sides; branchiostegals 6 or 7; pyloric cæca few;

gill rakers very short; pseudobranchiæ present. Dorsal fins 2, somewhat connected, the first of 8 to 11 spines, which are depressible in a groove; soft dorsal and anal fins anteriorly high, their bases thickened by the scales; anal spines 3 or 4, short; caudal fin truncate or doubly concave; pectorals short, the rays all branched; ventrals thoracic, normally I, 5; sometimes rudimentary; a large accessory scale as in the *Sparidæ;* air bladder large, commonly bifurcate in front, and with 2 slender horns behind. Vertebræ 10 + 14 = 24. Post-temporal bifurcate as usual among fishes, not joined to the skull. As here understood, a group of about 4 genera and 10 or 12 species, related to the *Chætodontidæ* but showing important differences in the skeleton, which shows resemblances to both Scombroid and Sparoid forms. Shore fishes mostly of large size, in warm seas, often valued as food.

The following diagnosis of this family is given by Dr. Gill: Chætodontoidea with a wide scaly isthmus extending from pectoral region to the chin and separating the branchial apertures; spinous partially differentiated from the soft portion of dorsal; upper jaw scarcely protractile; ethmoid cariniform above (not sunk and concave) and vomer declivous (not projecting forward or retuse), parapophyses spiniform and posteriorly inclosing a hæmal canal, and post-temporal bones bifurcated. (*Ephippus*, etc., Günther, Cat., II, 61, 1860.)

EPHIPPINÆ:
- *a.* First dorsal fin composed of spines connected by membrane, the third spine highest; ventrals well developed, I, 5.
  - *b.* Scales small, 55 to 70 in the lateral line. CHÆTODIPTERUS, 655.

MONODACTYLINÆ:
- *aa.* First dorsal fin composed of short free spines, the last one highest; ventrals small or rudimentary.
  - *c.* Ventrals small but normally developed, the rays I, 5; body not deeper than long. PARAPSETTUS, 656.

655. CHÆTODIPTERUS, Lacépède.

Chætodipterus, LACÉPÈDE, Hist. Nat. Poiss., IV, 503, 1802 (*plumieri* = *faber*).

Body much elevated and compressed, its outline nearly orbicular, the anterior profile nearly vertical. Scales small, 55 to 70 in the course of the lateral line. Jaws about equal; no teeth on vomer or palatines; teeth on jaws slender, somewhat movable; preopercle finely serrulate. Branchiostegals 6. Dorsal fins 2, somewhat connected, the first of usually 9 spines, the third of which is elongate; anal spines 3, small, the second the longest; ventral with a large accessory scale. Pyloric cæca 4 to 6. American; distinguished from the Asiatic genus *Ephippus*, by the very much smaller scales. (*χαίτοδων*, Chætodon; *δίς*; two; *πτερόν*, fin, the dorsal being divided.)

- *a.* Third dorsal spine more or less elevated, especially in the young. Atlantic. FABER, 2080.
- *aa.* Third dorsal spine scarcely higher than fourth, not more than ½ length of head. Pacific. ZONATUS, 2081.

2080. CHÆTODIPTERUS FABER (Broussonet).

(ANGEL-FISH; SPADE-FISH.)

Head 3 to 3½; depth 1 to 1½. D. VIII-I, 20; A. III, 18; scales 60; cæca 4 to 6. Vertical fins low in the young, falcate in the adult. Third dorsal spine more than ½ head, in adult about as long as from tip of snout to edge of preopercle, its membrane blackish, more produced in the young; chin with a row of pores; preorbital nearly as wide as eye; pectoral considerably shorter than ventral, the first soft ray of the latter filamentous. Grayish; a dusky band across the eye to the throat; a second similar band, broader, beginning in front of the dorsal and extending across base of pectoral to the belly; a third band, narrower, extending to middle of sides, from the base of fourth and fifth dorsal spines; a fourth broader band from the last dorsal spine to the anal spines, the remaining bands alternately short and long; all of these bands growing obscure and disappearing with age; ventrals black. Length 2 to 3 feet. Cape Cod to Rio Janeiro; very abundant on our South Atlantic coast; an excellent food-fish, reaching a large size. Very large specimens, which we suppose to be old individuals, but which have been regarded as a distinct species (*Ephippus gigas*, Cuvier), have the occipital crest and anterior interhæmals developed in thick bony masses. Similar changes occur in the adult of *Selene* and other *Carangidæ*. (*faber*, blacksmith; the species was called *Faber marinus* by Sloane.)

Faber marinus fere quadratus (the Pilot-fish) SLOANE, Nat. Hist. Jamaica, II, 290, pl. 251, 1793, Jamaica.

Chætodon faber, BROUSSONET, Ichth. Decas, 1, v, pl. 4, 1782, Jamaica (Coll. J. Ellis): Carolina (Coll. Dr. Blagden). [Society Islands, Banks & Solander.]

Zeus quadratus, GMELIN, Syst. Nat., I, 1225, 1788, Jamaica; after *Faber marinus fere quadratus* of SLOANE.

Chætodon plumieri, BLOCH, Ichthy., pl. 211, 1793, Martinique; after PLUMIER.

Selene quadrangularis, LACÉPÈDE, Hist. Nat. Poiss., IV, 564, 1803, Jamaica; after SLOANE.

Chætodon oviformis, MITCHILL, Trans. Lit. and Phil. Soc., I, 1815. 247, pl. 5, fig. 4, New York.

Ephippus gigas, CUVIER, Règne Anim., Ed. II. Vol. 2, 191, 1829, America; very old examples with swollen occipital crest; GÜNTHER, Cat., II, 61, 1860; HOLBROOK, Ichth. S. Car., 107, 1860.

Ephippus faber, GÜNTHER, Cat., II, 61, 1860; HOLBROOK, Ichth. S. Car., 107, 1860.

Chætodipterus faber, JORDAN & GILBERT, Synopsis, 613, 1883.

2081. CHÆTODIPTERUS ZONATUS (Girard).

Dorsal VIII–I, 18; anal II, 16; scales 70. Long rays of soft dorsal and anal ¼ longer than head. This species agrees with *Chætodipterus faber* in nearly all respects. The chief differences are that behind the great band from soft dorsal to anal in *C. zonatus* there are 2 other bands; 1 under middle of soft dorsal, the other at base of caudal, both distinct complete rings; no other bands. The third dorsal spine is not very high, being only about ½ length of head, and about twice height of the fourth. Length 2 feet or more. Pacific coast of America, San Diego to Panama; rather common southward. Occasionally seen at Mazatlan, several specimens being taken by us in the Astillero. It was found by Dr. Gilbert at Mazatlan and Panama. The original type of the species came from San

Diego, where no author subsequent to Girard has seen it. It is probably generally diffused along the coast, although less abundant than the corresponding species (*Chætodipterus faber* L.) is in the Atlantic. (*zonatus*, zoned or banded.)

Ephippus zonatus, GIRARD, Pac. R. R. Surv., x, pl. 110, 1858, San Diego. (Coll. A. Cassidy.)
Chætodipterus zonatus, JORDAN, Cat. Fishes, 102, 1885; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 160.

656. PARAPSETTUS, Steindachner.

Parapsettus, STEINDACHNER, Ichth. Beit., III, 50, 1875 (*panamensis*).

Body short and deep, much compressed, the depth not greater than the length. Scales very small, strongly ctenoid, covering the soft rays of the vertical fins; lateral line evenly arched. Snout short, vertically truncate at tip; mouth small; teeth close set, slender and sharp, in 3 or 4 rows, the outer slightly larger. Opercles unarmed. Soft dorsal and anal long and high, the tips falcate; spinous dorsal represented by 9 short free spines, scarcely rising above the surface of the scales; anal with 3 very small spines. Pectorals short; ventrals small, I, 5; caudal double concave, the outer lobe pointed, the median lobe rounded. One species. This genus differs from the East Indian *Monodactylus* (=*Psettus* Cuvier & Valenciennes) in having the ventral fins perfect and the body not excessively deep. The relations of this genus seem to us evidently with the *Ephippidæ* rather than with the Scombroids, among which *Monodactylus* has been generally placed. But *Capros* and *Antigonia* are not far distant from it. (*παρά*, near; *Psettus*, from *ψῆττα*, a flatfish, turbot.)

2082. PARAPSETTUS PANAMENSIS, Steindachner.

Head 3; depth $1\frac{1}{5}$. D. IX, 28; A. III, 24; P. 18. Form of *Chætodipterus faber;* the snout very blunt, the lower jaw included; maxillary reaching middle of eye; eye longer than snout, 4 in head. Last dorsal spine $\frac{1}{2}$ as long as eye, as long as third anal spine; longest rays of dorsal and anal as long as head, last ray of dorsal and anal shortest, the posterior part of fin rounded; caudal slightly longer than head; pectoral slightly shorter than head; first soft ray of ventral filiform, twice length of last, 2 in head. Color silvery gray, paler below; base of caudal yellowish, with brown dots. Panama (Steindachner); rare; several specimens lately obtained by Dr. Gilbert.

Parapsettus panamensis, STEINDACHNER, Ichth. Beit., III, 51, 1875, with an excellent figure, Panama.

FAMILY CLXV. CHÆTODONTIDÆ.*

(THE BUTTERFLY-FISHES.)

Body strongly compressed, elevated, suborbicular in outline, covered with moderate-sized or small scales, which are finely ciliated or nearly smooth; lateral line present, concurrent with the back, not extending on the caudal fin; mouth small, protractile, terminal; maxillary very short, irregular in form, divided in two by a longitudinal suture; upper part of skull solid, occipital crest strong; post-temporal firmly joined to the skull, its form really trifurcate though appearing simple, the interspaces between the forks filled in by bone so that only a foramen is left; last bone of suborbital ring firmly joined to the preoperculum; teeth brush-like or setiform, often extremely long, in narrow bands in the jaws; no teeth on vomer or palatines; no canines, molars, or incisors; eyes lateral, of moderate size; branchiostegals 6 or 7; pseudobranchiæ very large; air bladder present. Gill membranes more or less attached to the isthmus; gill rakers very small. Dorsal fin single, continuous, its rays sometimes filamentous, its soft part as well as the soft part of the anal densely covered with small scales; anal similar to the soft dorsal with 3 or 4 spines; ventrals thoracic, I, 5; caudal usually truncate. Vertebræ 10 + 14 = 24, the anterior abbreviated; insertion of the ribs inferior; post-temporal usually reduced, and not bifurcate. Carnivorous fishes of the tropical seas, noted for their singular forms, bright colors, and great activity. Genera 8 to 10; species about 180, most of them belonging to *Chætodon* and *Pomacanthus*. The excessive quickness of sense and motion enable these fishes to maintain themselves in the struggle for existence in the close competition of the coral reefs notwithstanding their bright colors. The young are very different from the adult, and pass through a stage termed *Tholichthys* in which the membranes are greatly developed, forming collars and sheaths about head and neck. (*Squamipinnes*, part, Günther, Cat., II, 1–57, 1860.)

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* For a review of the genera and species of Chætodontidæ of North America see paper by Eigenmann & Horning, in Annals N. Y. Ac. Sci., IV, 1887, 1–18.

CHÆTODONTINÆ:

- *a*. Preopercle unarmed; dorsal spines not graduated, some of the median spines longer than the last spines; scales comparatively large (young with the *Tholichthys* form).
  - *b*. Snout (nasals, palatines, etc.) with premaxillaries, articular, and dentary bones much produced, beak-like; cleft of mouth, with maxillaries, short; lateral line ceasing under soft dorsal.
    - *c*. Dorsal spines 12 or 13; soft rays about 20 (19 to 23).
      - *d*. Scales large; beak moderate. PROGNATHODES, 657.
      - *dd*. Scales small, about 75 in horizontal series; beak very long. FORCIPIGER, 658.
  - *bb*. Snout little if at all produced; dorsal spines usually 12 to 14; not graduated, some of the middle ones highest; anal spines 3. CHÆTODON, 659.

POMACANTHINÆ:

- *aa*. Preopercle armed at its angle with a very strong spine, which is sometimes grooved.
  - *e*. Interopercle unarmed; vertical limb of preopercle above spine entire or nearly so; dorsal fin with 8 to 11 spines, its soft rays 23 to 32. POMACANTHUS, 660.
  - *ee*. Interopercle short and broad, armed with 1 to 4 strong spines; preopercle serrate or spinous; dorsal spines about 14, graduated, the last one longest; scales rather small; isthmus very narrow.
    - *f*. Vertical limb of preopercle simply serrate, with 10 to 30 small teeth; body oblong, rather robust. HOLACANTHUS, 661.
    - *ff*. Vertical limb of preopercle with 3 to 9 conspicuous spines; body ovate, much compressed. ANGELICHTHYS, 662.

657. PROGNATHODES, Gill.

Prognathodes, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 238 (*pelta*=*aculeatus*; name only).

This genus is intermediate between *Chelmon* and *Chætodon*, having the produced snout of the former and a fin formula more like that usually seen in the latter. Scales large. One species known. (*πρό*, before; *γνάθος*, jaw; *εἶδος*, likeness.)

2083. PROGNATHODES ACULEATUS (Poey).

Head 3; depth 2. D. XIII, 19; A. III, 15; scales 8–40–19. Snout moderately produced, about ½ length of head; profile steep, concave. Maxillary reaching to middle of snout. Angle of preopercle rounded, minutely serrate. Dorsal spines long and very strong; fourth spine 2 in depth; membrane between spines deeply notched; soft anal higher than soft dorsal, their basal halves alone scaled; caudal truncate. Uniform reddish brown, with shining longitudinal streaks, following the series of scales; spinous dorsal and its base blackish; soft dorsal bordered with orange; other fins yellowish or colorless; border of opercle orange; ocular band dark, narrower than eye, without paler border, not extending below eye. (Günther.) West Indies. Known only from the accounts of Günther and Poey. (*aculeatus*, spine.)

Chelmon aculeatus, POEY, Memorias, II, 202, July, 1860, Havana.
Chelmo pelta, GÜNTHER, Cat., II, 38, September, 1860, locality unknown.
Prognathodes aculeatus, POEY, Synopsis, 354, 1868; EIGENMANN & HORNING, Ann. N. Y. Ac. Sci., IV, 1887, 2.

658. FORCIPIGER, Jordan & McGregor.

Forcipiger, JORDAN & MCGREGOR, new genus (*longirostris*).

This genus differs from *Chelmon*, Cuvier, in the long and high spinous dorsal, which is composed of 12 stout spines (9 in *Chelmon*). The snout, as in *Chelmon*, is very long and slender, bearing the short, forcep-like jaws at the end. From *Prognathodes*, a genus still more closely related, *Forcipiger* differs in the small scales, there being about 75 in a horizontal series. Pacific Ocean. Two closely related species known—*F. longirostris* (Cuvier & Valenciennes) from the East Indies, and the following. (*forceps*, tweezers; *gero*, I bear.)

2084. FORCIPIGER FLAVISSIMUS, Jordan & McGregor, new species.

Head 2½; depth 2; eye 6½ in head. D. XII, 22; A. III, 17; snout 1⅘ in head. Body short, strongly compressed, its outline angular; anterior profile very steep, concave. Mouth small, at the tip of the projecting snout; cleft of mouth 1½ in eye. Scales quite small, ctenoid, 9–75–35, irregularly placed, smaller on head and bases of fins, the rows along lateral line parallel with it only anteriorly, those below run horizontally on lower parts of the body and irregularly upward and backward above; lateral line concurrent with the back. Dorsal spines extremely strong, fifth spine $1\frac{3}{4}$ in head, longest soft rays $2\frac{1}{2}$ in head; caudal $2\frac{1}{6}$ in head, slightly lunate, upper lobe longer; third anal spine very long, much longer than second, $1\frac{4}{5}$ in head; pectoral $1\frac{1}{4}$ in head; ventral $1\frac{1}{2}$ in head. Color bright orange, deepest at base of dorsal; head and nape abruptly black to level of lower point of eye, below this point reddish pearly; breast and lower jaw nearly white; preorbital bones paler than cheeks, which are mottled with brownish; median region of top of head paler; pectoral slightly dusky; dorsal and anal colored like body, the last rays of anal with a large black blotch, vertically oblong, its longest diameter a little greater than diameter of eye, not ocellated as in *F. longirostris;* soft rays of dorsal and anal blackish at tip, the very edge pale; caudal abruptly blackish. This species is extremely close to *F. longirostris,* which is common in the East Indies. The American species differs, however, in the deeper body and the much larger anal spot, which is almost round in the East Indian species. Rocky Islands, off the west coast of Mexico; numerous specimens from Clarion and Socorro islands, 6 to 8 inches in length. (*flavissimus,* very yellow.)

Forcipiger flavissimus, JORDAN & MCGREGOR MS., Clarion and Socorro islands, Revillagigedo Archipelago. (Type, No. 5709, L. S. Jr. Univ. Mus. Coll. Richard C. McGregor.)

659. CHÆTODON* (Artedi) Linnæus.

(BUTTERFLY-FISHES.)

Chætodon, ARTEDI, Genera, 51, 1738 (numerous species, the first one mentioned belonging to *Pomacanthus;* nonbinomial).

Tetragonoptrus, KLEIN, Historia Piscium, 37, 1744 (many species; *striatus,* etc.; nonbinomial).

Chætodon, LINNÆUS, Systema Naturæ, Ed. X, 272, 1758 (includes all known *Chætodontidæ*).

Chætodon, CUVIER, Règne Animal, Ed. II, Vol. 2, 189, 1829 (*striatus, capistratus;* first restriction of the name to the present group).

Rabdophorus, SWAINSON, Class'n Fishes, II, 21, 1839 (*ephippium*).

Citharœdus, KAUP, Wiegmann's Archiv, 1860 (*meyeri*).

Linophora, KAUP, Wiegmann's Archiv, 1860 (*auriga*).

Sarothrodus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 238 (*Chætodon* CUVIER, *nec* ARTEDI; offered as a substitute for *Chætodon,* the latter name being transferred to *Pomacanthus*).

Tholichthys, GÜNTHER, Ann. Mag. Nat. Hist. 1868, 457 (*osseus;* larval form).

Tetragonoptrus, BLEEKER, Rev. Famille Chætodontoides, 52, 1877 (*striatus*).

Chætodontops, BLEEKER, *l. c.,* 53, 1877 (*collaris*).

Hemichætodon, BLEEKER, *l. c.,* 53, 1877 (*capistratus*).

Lepidochætodon, BLEEKER, *l. c.,* 54, 1877 (*unimaculatus*).

Gonochætodon, BLEEKER, *l. c.,* 54, 1877 (*triangulum*).

Chætodon, JORDAN & GILBERT, Synopsis, 614, 1883 (restriction to *capistratus*).

Anisochætodon, KLÜNZINGER, Fische des Rothen Meeres, 54, 1884 (*auriga*).

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* The Linnæan genus, *Chætodon,* is based on various species, chiefly of this family, the *Pomacentridæ* and *Teuthididæ.* Forskål, in 1775, removed the latter elements to form his subgenera *Abudefduf* and *Acanthurus; Pomacanthus* and *Holacanthus* were removed by Lacépède, and by Cuvier the genus was limited essentially to its present boundaries. One of the two Linnæan species, *striatus* and *capistratus,* mentioned by Cuvier must be regarded as the type of *Chætodon.* Of these *striatus* was chosen as type of *Tetragonopterus,* which would apparently leave *capistratus* as the type of *Chætodon.* The use by Bleeker of *Chætodon* for *Pomacanthus* is justified only by the peculiar rules of nomenclature adopted by Bleeker. This code recognized pre-Linnæan genera, and made the first species mentioned under a new generic name as the type of it.

Body short, deep, very strongly compressed, especially above and behind; head small, compressed, almost everywhere scaly; mouth very small, terminal, the jaws provided with long, slender, flexible, bristle-like teeth; vomer sometimes with teeth; preoperculum entire or nearly so, without spine. Dorsal fin single, continuous, not notched, the spinous part longer than the soft part, of about 13 spines, the spines not graduated, some of the middle ones being longer than the last; last rays of soft dorsal usually rapidly shortened, some of them occasionally filamentous (in East Indian species); caudal peduncle short, the caudal fin fan-shaped; anal similar to soft dorsal, preceded by 3 or 4 strong spines. Body covered with rather large ctenoid scales, somewhat irregular in their arrangement; the lateral line curved, high, parallel with the back. Gill openings rather narrow, the membranes narrowly joined to the isthmus; branchiostegals 6. A very large genus of singular and beautiful fishes, abounding in the tropical seas, especially about volcanic rocks and coral reefs; most of them have the body crossed by transverse black bars. They are all very active, feeding on small animals. (*χαίτη*, bristle; *ὀδούς*, tooth.)

a. Scales on trunk all subequal, their posterior margins regularly rounded. None of the rays of the soft dorsal produced.

CHÆTODONTOPS (*Chætodon;* ὤψ, appearance):

b. Series of scales below axis of body running obliquely upward and backward, the lowest becoming more or less horizontal.

c. Ocular band extending from nape only to eye; a transverse band between eyes. NIGRIROSTRIS, 2085.

cc. Ocular band extending from nape beyond eye across the cheek and interopercle.

d. Base of soft dorsal with a large black spot, not ocellated. OCELLATUS, 2086.

dd. Base of soft dorsal without black spot.

e. Humeral band present. HUMERALIS, 2087.

ee. Humeral band absent.

f. Body with a dark band between dorsal and anal, no caudal ocellus.

g. Ocular band edged with yellowish or whitish above, soft dorsal and anal with much black. SEDENTARIUS, 2088.

gg. Ocular band jet-black, not white edged; soft dorsal and anal without black. AYA, 2089.

ff. Body without black cross bands, the ocular band only present; an ocellus on caudal peduncle. ATÆNIATUS, 2090.

CHÆTODON:

bb. Series of scales below axis of body extending downward and backward, forming an angle with those above, each series marked by a continuous black streak.

h. Body without ocelli, crossed by dark bands. STRIATUS, 2091.

hh. Body with a large black ocellus below soft dorsal. CAPISTRATUS, 2092.

hhh. Body with 2 ocelli, a large one on caudal peduncle and a smaller one on first 8 or 9 soft rays of dorsal. BRICEI, 2093.

Subgenus CHÆTODONTOPS, Bleeker.

2085. CHÆTODON NIGRIROSTRIS (Gill).

D. XII, 24; A. III, 20; scales 44. Body deep, the depth 1⅔ in extreme length; snout little produced, its length less than that of eye; ocular band extending from dorsal only to eye, not across the cheek; muzzle with a blackish band; a transverse band between the eyes, much narrower than eye; a band between dorsal fin and interorbital area, descending to temples and bordered with whitish; another across dorsal fin, caudal peduncle, and near margin of anal, the anterior margin of which extends from the base of the anterior soft rays to axilla of anal fin; caudal, produced part of dorsal, margin of anal, and all of pectoral and ventral fins pale. Cape San Lucas; only the original types known. (*niger*, black; *rostrum*, beak.)

Sarothrodus nigrirostris, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 243, Cape San Lucas (Coll. Xantus.)

Chætodon nigrirostris, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 365; EIGENMANN & HORNING, *l. c.*, 7, 1887.

2086. CHÆTODON OCELLATUS, Bloch.

(PARCHÉ; ISABELITA DE LA ALTO.)

Head 3; depth 1½. D. XII or XIII, 20; A. III, 16; scales 6–34–15, 31 in a median series. Body subrhomboidal, the anterior profile concave; snout somewhat produced, longer than eye in adult; lateral line extending to below posterior third of soft dorsal; dorsal and anal fins angulated behind. Color golden gray; a large nonocellated black spot on base of soft dorsal, an indistinct band extending vertically from this spot to base of anal; a small black spot on tip of soft dorsal (not present in young); ocular band narrower than eye, extending from in front of dorsal through eye and over interopercle; no humeral band; a black spot on opercle above. West Indian fauna; common at Havana, the young straying northward in the Gulf Stream to New Jersey and Rhode Island. (*ocellatus*, with eye-like spots.)

Chætodon ocellatus, BLOCH, Ichthologia, pl. 211, fig. 2, 1787.

Chætodon bimaculatus, BLOCH, Ichthologia, pl. 219, fig. 1, 1790; CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 67, 1831; POEY, Memorias, II, 371, 1860; GÜNTHER, Cat., II, 9, 1860; JORDAN & GILBERT, Synopsis, 940, 1883.

Sarothrodus maculocinctus,* GILL, Proc. Ac. Nat. Sci. Phila. 1861, 99, Newport, R. I.; young.

Sarothrodus amplexicollis, POEY, Enumeratio, 63, 1875, Cuba; young.

Chætodon maculocinctus, JORDAN & GILBERT, Synopsis, 616, 1883.

Chætodon ocellatus, EIGENMANN & HORNING, *l. c.*, 7, 1887.

2087. CHÆTODON HUMERALIS, Günther

(MUÑECA; DOLL FISH.)

Head 3; depth 1⅓; eye 3. D. XIII, 20; A. III, 17; scales 6–30–17. Body deep, the back elevated, the profile steep and slightly concave or straight; snout very slightly produced, shorter than eye. Scales rather large; all in series running upward and backward, the series not marked by continuous black streaks, either plain or with dusky spots; lateral line extending to below posterior end of soft dorsal. Color golden gray; the black ocular band narrower than eye, edged with pale, extending from nape across eye and over cheek and interopercle; humeral band present, broader than eye, extending from front of spinous dorsal through base of pectoral to ventral; a broad band from last dorsal spines to base of anal; soft dorsal and anal with a dark band parallel with the margin; 3 dark bands across caudal peduncle at base of fin; caudal fin with a faint band; ventrals dark; pectoral and edges of vertical fins pale. Pacific coast of tropical America from Guaymas to Panama;* very common, especially about rocks. Length 8 inches. A handsome little fish. (*humeralis*, pertaining to the shoulder from the broad humeral band.)

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* *Chætodon maculocinctus* (GILL). Head 2¾; depth 1½. D. XII, 19; A. III, 17. Body suborbicular, closely compressed; profile steep, concave, the short snout projecting; mouth very small, maxillary not reaching the vertical from the anterior nostril; caudal peduncle very short; lateral line beginning at upper angle of opercle, running obliquely upward to opposite the base of soft dorsal and then decurved, ending opposite extremity of soft dorsal. Olivaceous, darker above; a dark-brown band from beginning of dorsal fin obliquely forward through eye and across the cheeks; a second bar beginning in a blotch on soft dorsal, runs vertically across the body. Atlantic coast in the Gulf Stream; doubtless the young of *Chætodon ocellatus*.

Chætodon humeralis, GÜNTHER, Cat., II, 19, 1860, Sandwich Islands (by error); GÜNTHER, Fishes Central America, 419, pl. 65, fig. 3, 1866; EIGENMANN & HORNING, *l. c.* 8, 1887; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 160.

2088. CHÆTODON SEDENTARIUS, Poey.

Head $3\frac{1}{5}$; depth $1\frac{3}{4}$. D. XIII, 23; A. III, 19; scales 7–38–17. Body rather deep, the back elevated; snout subconical, somewhat produced, scarcely as long as eye, the profile concave. Dorsal and anal somewhat rounded behind. Rows of scales extending upward and backward on upper parts of body, those above most oblique, those of sides of belly mostly nearly horizontal; no dark streaks along scales. Body yellowish, dusky above; ocular band dusky, very broad above, narrower below, edged with whitish above in front, and broadly margined with yellow behind above, continued below across the interopercle, the edgings merging below to silvery; a very broad dark-brown vertical band from extremity of dorsal across tail over posterior half of soft dorsal and anal, edged behind with white; caudal and ventrals pale. West Indies; rather scarce; our specimen taken by the *Albatross* at St. Lucia. (*sedentarius*, quiet, prone to sit.)

Chætodon sedentarius, POEY, Memorias, II, 203, 1860, Cuba; EIGENMANN & HORNING, *l. c.*, 8, 1887.
Chætodon gracilis, GÜNTHER, Cat., II, 20, 1860, Caribbean Sea; West Indies.
Sarothrodus sedentarius, POEY, Synopsis, 364, 1868.

2089. CHÆTODON AYA, Jordan.

Head $2\frac{1}{2}$; depth $1\frac{3}{5}$; snout $2\frac{2}{3}$ in head. D. XII, 18; A. III, 17; scales 9–36–17. Body short and deep, strongly compressed. Snout narrow, sharp, considerably produced, its outline forming in front of eye a sharp angle with the profile of the head; anterior profile steep and straight from before eye to first dorsal spine; eye large, about as long as snout (in young), a little longer than post-orbital part of head. Dorsal fin high, the second spine highest, very strong, as long as head; soft dorsal high, higher than the posterior spines, the longest rays about ½ head; anal similar to soft dorsal, its second spine stouter than third, and about equal to it in length, about ½ length of head; caudal fin somewhat rounded, 1½ in head; ventrals not quite reaching anal; pectorals still shorter. Scales of moderate size, the soft parts of the vertical fins less scaly than usual; lateral line running very high and ceasing abruptly under first ray of soft dorsal. Color in spirits, light yellowish, with 2 oblique jet-black cross bands, and no other spots or ocelli, first band involving first and second dorsal spines, then extending downward and forward, close behind the line of the profile and across the eye and across the cheek, where it is fainter; this band a little narrower than the eye; the second band more than twice as broad as the first, beginning abruptly with nearly all the membrane of the fourth and fifth dorsal spines, covering the fifth spine from its base to near its tip; the posterior border of the black band extending from near the tip of the fourth spine in a straight line across the dorsal fin and the body to near the base of the last anal ray; the anterior margin runs in a slightly concave line from the base of the fourth spine to the middle of the base of the anal; the lower border follows the base of the anal fin without including any of it; this band broadest on the dorsal fin and gradually narrows downward; middle line of forehead with a dusky shade; no dark on soft dorsal, caudal, caudal peduncle, anal, pectorals, ventrals, or opercles. Gulf of Mexico, in rather deep water; the type 1½ inches long, taken from the stomach of *Neomænis aya* on the Snapper Banks. (*aya*, specific name of the fish (*Neomænis aya*) in whose stomach the type specimen was found.)

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* Erroneously attributed to the Sandwich Islands by Dr. Günther; the types probably from Panama.

Chætodon aya, JORDAN, Proc. U. S. Nat. Mus. 1886, 225, Snapper Banks, near Pensacola, Florida (Type, No. 37747. Coll. Jordan & Stearns); EIGENMANN & HORNING, *l. c.*, 8, 1887.

2090. CHÆTODON ATÆNIATUS (Poey).

Body oval, the depth 2 in total length; eye 3½ in head (3 in young of 1 inch); scales not in series, having contrary directions as in *Chætodon capistratus;* scales in lateral line 35, the series ending at end of dorsal. Color steel gray; fins yellowish; ocular band present, but no other cross bands; below end of lateral line and above middle of caudal peduncle a black ocellus smaller than in *Chætodon capistratus.* Havana (Poey); known from one very young specimen, unless *Chætodon unicolor* is the same species, as is probable. (*α*–, without; *ταινία,* ribbon or band.)

Sarothrodus atæniatus, POEY, Synopsis, 353, 1868, Havana.

? Chætodon unicolor, * SAUVAGE, Bull. Sci. Philom., IV, 222, 1880, Martinique. (Coll. Bélanger.)

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* The following is the original description of *Chætodon unicolor:* D. XIII, 19; A. III, 15; lat. 40. Hauteur du corps contenue deux fois dans la longueur. Museau pointu, un peu plus long que le diamètre de l'oeil; preopercule dentelé. Corps de coleur brune uniforme, rembruni sur le dos; une bande oculaire étroite; extrémité de la dorsale molle et de l'anale de couleur claire; ventrales grisâtres. Longeur 0.80 m. Martinique. Bélanger. (*unicolor*, one-colored.)

2091. CHÆTODON STRIATUS, Linnæus.

(BUTTERFLY.)

Head 3; depth 1½; eye 3⅖. D. XII or XI, 21; A. III, 8; scales 8–40–16. Body ovate, compressed, the anterior profile somewhat concave. Soft dorsal and anal somewhat angulate behind; snout little produced, very little longer than eye. Series of scales above lateral line running upward and backward, less straight than in *Chætodon capistratus*, above and below with a continuous black streak, which is conspicuous, the streaks somewhat undulate, converging backward. Series of scales below axis of body running downward and backward, more nearly horizontal than in *Chætodon capistratus*. Side whitish, with narrow dark lines between the rows of scales; a black stripe from occiput through eye to lower side of head; a broad, dusky band from anterior part of dorsal across sides behind pectoral and ventral, not hiding the longitudinal markings; another similar one from posterior part of spinous dorsal to and across middle of anal; an olive band across caudal peduncle and fins adjacent; soft dorsal and anal light at base, a broad olive band through middle, this edged with black, the tips narrowly yellowish; caudal similar, but with an additional colorless margin; olive mottlings at base of caudal; pectoral colorless; ventral plain, dusky, lighter at base; sometimes a large, ill-defined, rosy blotch behind pectoral. West Indies to Brazil, rather common; our specimen from Bahia. (*striatus*, striped.)

Chætodon macrolepidotus, lineis utrinque tribus nigris latis, ARTEDI, Synopsis, 95, 1738; no locality.

Labrus rostro reflexo fasciis lateralibus tribus fuscis, LINNÆUS, Amœn. Ac., I, 595, 1749; after ARTEDI.

Chætodon striatus, LINNÆUS, Syst. Nat., Ed. X, 275, 1758, India (after *Chætodon macrolepidotus*, etc., ARTEDI); CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 10, 1831; POEY, Memorias, II, 371, 1860; GÜNTHER, Cat., II, 8, 1860; EIGENMANN & HORNING, *l. c.*, 8, 1887.

Sarothrodus striatus, POEY, Synopsis, 352, 1868.

Subgenus CHÆTODON.

2092. CHÆTODON CAPISTRATUS, Linnæus.

(PARCHÉ.)

Head 3¼; depth 1⅔. D. XIII (or XII), 19; A. III, 17; scales 6–42–17. Body not very deep, the back moderately elevated, the anterior profile somewhat concave; snout somewhat produced, as long as the eye; soft dorsal and anal fins angulated behind; dorsal spines rather slender; scales rather large, their arrangement peculiar, those above the level of the upper part of the eye placed in straight series which run upward and backward, those below this line in series running similarly downward and backward, each series of scales being sharply marked by a continuous blackish streak on the skin underneath the scales. Ocular band black, edged on both sides with white, much narrower than eye, and extending across eye and cheek, the 2 meeting on the nape; a very large jet-black spot, ½ broader than eye, broadly ocellated with whitish on body below soft dorsal; soft anal and caudal each with a brown band becoming black on each edge, the one on caudal most distinct; the edges of vertical fins abruptly pale. Length 6 inches. West Indies, generally common; our specimens examined from Havana. A most beautiful little fish. (*capistratus,* wearing a bridle or headdress.)

Chætodon capistratus, LINNÆUS, Syst. Nat., Ed. x, 275, 1758, India; on a specimen in Mus. Adolph-Frederici; CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 64, 1831; GÜNTHER, Cat., II, 12, 1860; JORDAN & GILBERT, Synopsis, 940, 1883; EIGENMANN & HORNING, *l. c.* 9, 1887.

Sarothrodus capistratus, POEY, Enumeratio, 62, 1875.

2093. CHÆTODON BRICEI, H. M. Smith.

Head about 3; depth $1\frac{4}{5}$; eye large, $2\frac{5}{6}$ in head. D. XIII, 20; A. III, 18; scales 6–40–17. Body short, deep, and much compressed; profile steep, slightly convex; head rather large, pointed; mouth small, terminal; snout not produced, $\frac{5}{6}$ length of eye; lateral line beginning at posterior edge of eye, curving upward and backward, and terminating under anterior part of soft dorsal fin; scales large, the rows above longitudinal axis of body directed upward and backward, those below inclined slightly downward. Caudal peduncle very short, about as broad as eye. Dorsal long, elevated, the longest spine $\frac{6}{7}$ length of head; soft dorsal evenly rounded; basal half of both portions of fin thickly covered with small scales; dorsal origin opposite posterior edge of opercle; anal fin deep, long, rounded, the proximal $\frac{2}{3}$ of soft portion densely squamated, the small scales also covering the bases of second and third spines; caudal short, rounded; pectorals $\frac{2}{3}$ length of head, rounded; ventrals as long as pectorals, pointed. Colors in life: General body color, pearly gray; a glistening jet-black band about $\frac{2}{5}$ width of eye and having a forward curve beginning a short distance in front of dorsal and extending downward through eye and thence downward and backward to lower margin of gill opening; this not extending on breast and hence not meeting its fellow of the opposite side; above eye this stripe is bordered on each side by a very narrow pale streak; a dull blackish band, $1\frac{1}{3}$ times as wide as eye, running vertically across body from base of dorsal to median line of abdomen; the anterior border of this band extending from front of dorsal to posterior angle of opercle, thence obliquely downward and backward behind base of pectoral; behind this band and separated from it by a space somewhat wider than eye is another dark band, duller and $\frac{2}{3}$ wider, with its anterior edge curved forward and its posterior margin on the caudal peduncle; involving about $\frac{2}{3}$ width of this band, and extending from dorsal to ventral edge of body is a large, circular ocellus, more than $1\frac{1}{2}$ times eye, consisting of a dark-blue spot surrounded by a narrow white zone, which covers a part of the base of the soft dorsal; immediately above this, and within the extension on the dorsal fin of the dark band, is another similar but smaller ocellus, about the size of eye, involving first 8 or 9 rays of soft dorsal; a narrow dark-brown vertical bar on caudal peduncle, separated from base of caudal rays and from that part of the broad body band posterior to the ocellus by narrow white spaces; head in front of ocular stripes, and breast, greenish yellow; a black crescentic mark on opercle; spinous dorsal dusky, the dark vertical band extending on the first 7 spines; soft dorsal dark, with sharply defined pale edge; part of anal covered by scales dusky, with a narrow darker margin; unscaled portion yellowish white; caudal and pectorals pale; ventrals dusky, edged with yellow. Length 1½ inches. Woods Hole, Massachusetts; only the type and 2 other specimens known, all collected by Dr. H. M. Smith in the summer of 1897; evidently the young of some tropical species brought north in the Gulf Stream. (Named for Capt. John J. Brice, U. S. Commissioner of Fish and Fisheries.)

Chætodon bricei, H. M. SMITH, Bull. U. S. Fish Comm. 1897, pp. 102–103, with plate, Woods Hole. (Type No. 48526.)

660. POMACANTHUS, Lacépède.

(CHIRIVITAS.)

Pomacanthus, LACÉPÈDE, Hist. Nat. Poiss., IV, 517, 1803 (*arcuatus*, as restricted by Cuvier).

Pomacanthodes, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 244 (*zonipectus*).

Chætodon, BLEEKER, Arch. Nederl. Sci. Nat., XII, 5, 1876 (transferred to species of *Pomacanthus*, as the first species of *Chætodon* mentioned by Artedi belongs to the latter group, and the first species mentioned by Lacépède under *Pomacanthus* belongs to *Zanclus*).

Body much compressed and elevated, covered with small scales, among which smaller ones are distributed so that the series are not distinct; preopercle with a very strong spine at its angle, the vertical limb entire in the adult, usually serrulate in the young; interopercle entire or nearly so; dorsal fin entirely scaly, with 8 to 11 graduated spines; soft dorsal usually much elevated in front; anal with 3 graduated spines; branchiostegals 6; air bladder with 2 posterior horns; pyloric cæca numerous. Species few, in the tropical seas; chiefly American; the young brilliantly colored, the adult usually dull colored. The species vary greatly with age, and have been almost inextricably confused, as the age variations are much more striking than the specific distinctions. The number of dorsal spines is usually diagnostic. (πῶμα, operculum; ἄκανθα, spine.)

POMACANTHUS:
- *a.* Dorsal spines VIII to X, 29 to 32.
  - *b.* Scales in lateral line about 50 to 55; dorsal VIII or IX, 30 to 32. A. III, 24. Color of adult steel gray or scarcely yellowish; young with 4 whitish cross bands. ARCUATUS, 2094.
  - *bb.* Scales in lateral line 70 to 90; dorsal usually X, 29 or 30; anal III, 23 or 24. Color black in adult, with yellow mottlings; base of pectoral yellow; young with several yellowish cross bands. PARU, 2095.

POMACANTHODES (*Pomacanthus*; εἶδος, likeness):
- *aa.* Dorsal XI, 23; anal III, 20 to 22. Adult brown, with a dark pectoral band; young with about 5 yellow curved cross bars. ZONIPECTUS, 2096.

Subgenus POMACANTHUS.

2094. POMACANTHUS ARCUATUS (Linnæus).

(BLACK ANGEL; CHIRIVITA; PORTUGAIS.)

Head 3½; depth 1⅓; eye 3½; snout 2⅓. D. VIII or IX, 30 to 32; A. III, 24; scales 8–53–27, the larger scales surrounded by smaller ones; caudal fin rounded. Color: adult grayish without tinge of yellow, the center of each scale blackish, the edge pearly gray; head and vertical fins dusky gray, their tips blackish; no pale stripe before eye; space behind preopercular spine pale; a narrow yellowish bar near tip of caudal, followed by a dark streak, the tip of the fin whitish; pectoral yellowish, especially its inner side and its basal half, its tip translucent; no orange on base of pectoral; lower jaw pale flesh color; ventrals brown, yellowish at tip; younger individals have a whitish cross bar on the anterior part of body, behind which are sometimes still others; in alcohol rich russet brown, the black spot on each scale faded, the pearly gray edge satiny white; vertical fins brown, base of dorsal with numerous small white specks. Length 1½ to 2 feet. West Indies, occasionally north to New Jersey, south to Bahia. Common; like the other species of the genus, varying excessively with age. Frequently taken with spear or hook; not valued as a food-fish. (*arcuatus*, arched, relating to the curved cross bands.)

Chætodon arcuatus, LINNÆUS, Syst. Nat., Ed. x, 273, 1758, India; from spec. Mus. Ad. Fr.; D. VIII, 30; dusky with 5 dark bands; POEY, Synopsis, 351, 1868.

Chætodon aureus, BLOCH, Ichthyol., pl. 193, fig. 1, 1787, Martinique; on a drawing by PLUMIER, the spines 9 in the original drawing; POEY, Synopsis, 350, 1868.

Chætodon lutescens, BONNATERRE, Encycl. Meth., 182, 1788, Jamaica; after BROWNE.

Chætodon littoricola, POEY, Synopsis, 351, 1868, Cuba (Coll. Poey); black fins bordered with yellowish; fin rays not counted.

Pomacanthus balteatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 208, 1831, Porto Rico (Coll. Plée); POEY, Memorias, II, 371, 1861.

Pomacanthus cingulatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 209, 1831, West Indies; probably sent by Plée from Porto Rico.

Pomacanthus quinquecinctus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 210, 1831, West Indies, probably from Porto Rico.

Pomacanthus aureus, LACÉPÈDE, Hist. Nat. Poiss., IV, 518, 1802; CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 202, 1831; EIGENMANN & HORNING, *l. c.*, 12, 1887.

Pomacanthus paru, GÜNTHER, Cat., II, 55, 1860; in part.

Pomacanthus arcuatus, JORDAN & RUTTER, Proc. Ac. Nat. Sci. 1897, 125.

2095. POMACANTHUS PARU (Bloch).

(PARU; INDIAN FISH; FLATFISH.)

Head 3½; depth 1⅓. D. X, 29 or 30; A. III, 23 or 24; scales about 65 in a median series, 85 to 90 in the series above the lateral line; caudal fin truncate. Color black; young with 5 yellowish cross bands, the first on the snout, the second across the opercle, the third across the body under the tip of the pectoral fin, the fourth across the posterior third of the body, and the fifth on the caudal peduncle; the third turns backward above and extends along the outer edge of the dorsal fin to its tip; the fourth crosses the anal near its middle and extends backward across dorsal in a similar way; base of pectoral orange; caudal rounded, its border not pale; most of the scales edged with yellow. This species is well distinguished from *Pomacanthus arcuatus* at all ages by the smaller scales and by the presence of 10 dorsal spines instead of 9. The adults of the 2 are also different in color. In *Pomacanthus arcuatus* each scale has a whitish crescent; there is a white stripe from eye to nostril; the caudal and dorsal without pale edge, and there is no pale area behind preopercular spine. In both species the young show pale cross bands, and of these the one behind the shoulder persists longest. Length a foot or more. West Indies, south to Bahia; not rare southward; not yet recorded from the coast of the United States. (*Paru*, a Brazilian name, used by Marcgrave.)

Chætodon paru, BLOCH, Ichthyol., pl. 197, fig. 1, 1787, Brazil; on a drawing; POEY, Synopsis, 351, 1868.

Pomacanthus arcuatus,* CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 211, 1831; not *Chætodon arcuatus*, L.; LÜTKEN, Spolia Atlantica, 61, 1880; JORDAN & GILBERT, Synopsis, 616, 1883; EIGENMANN & HORNING, *l. c.*, 9, 1887.

Pomacanthus paru, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 205, 1831; GÜNTHER, Cat., II, 55, 1860, in part; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 124.

Subgenus POMACANTHODES, Gill.

2096. POMACANTHUS ZONIPECTUS (Gill).

(MOJARRA DE LAS PIEDRAS.)

Head 3½ to 3⅔; depth 1¼ in adult to 1½ in young; eye 3½ in head. D. XI, 23; A. III, 20 to 22; scales 70. Profile very steep, uneven; preopercular spine longer than eye, 3⅓ in head; preorbital equal to maxillary, 1⅓ in head; last dorsal spine 1½ in head; longest dorsal ray ⅕ longer than head, falcate; anal rounded, its soft rays much lower than those of dorsal; caudal short, truncate, 1¼ in head; pectoral moderate; ventral very long, ¼ longer than head, the first ray filamentous. Scales irregular, large and small ones intermixed, those of head, breast, and nape minute. Interopercle with one stoutish spine; preopercle very finely serrate. A large hump at nape in adult. Adult, dark gray, blackish posteriorly, most scales with black centers; edges of scales bright sky blue in life, especially posteriorly; a triangular bronze-yellow patch in front of line connecting pectorals with ventrals, then a diffuse blackish bar from front of dorsal along region behind pectorals to ventrals, then a broad curved bar of yellow, obscured by blackish centers of scales, behind this a diffuse blackish area; breast vermiculated with blue and yellowish; a blackish bar covering most of head, behind which the opercles and nape are yellowish; jaws pale bluish; dorsal orange, vermiculate with sky blue, the edge bright sky blue, below which is orange; caudal orange, vermiculated with sky blue, the edge orange, the very margin blackish; anal blackish, vermiculated with sky blue; pectorals light orange, marked with grayish blue; ventrals largely blue black, tipped with orange; spine bluish. Young, pure black on dorsal and anal; top of head with a median line of bright yellow, dividing at the snout and extending along each side of mouth and meeting on throat below; side with 5 very distinct narrow bright-yellow cross bars, strongly convex forward; blue lines between these bars. Length 18 inches. West coast of tropical America; rather common about rocks from Mazatlan to Panama; a beautiful fish, showing great changes in color in the course of development. (ζώνη, zone; *pectus*, breast.)

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* Most recent writers have called this species *Pomacanthus arcuatus*, but the true *arcuatus* of Linnæus must be the preceding species.

Pomacanthodes zonipectus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 244, San Salvador.
Pomacanthus crescentalis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881. 358, Mazatlan; young. (Type, No. 28139. Coll. Gilbert.)
Pomacanthus zonipectus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 376: EIGENMANN & HORNING, *l. c.*, 14, 1887.

661. HOLACANTHUS, Lacépède.

(CATALINETAS.)

Holacanthus, LACÉPÈDE, Hist. Nat. Poiss., IV, 525, 1803 (*tricolor*).
Genicanthus, SWAINSON, Class'n Fishes. II, 212, 1839 (*lamarckii*).
Centropyge, KAUP, Wiegmann's Archiv. XXVI, 1876, 138 (*tibicen*).
Acanthochætodon, BLEEKER, Archiv Neerl. Sci. Nat., XII, 5, 1876 (*lepidolepis*).

Body oblong, rather robust, the back not greatly elevated nor compressed; scales rather small, roughish, often mixed with smaller ones. Vertical limb of the preopercle with small equal serræ; a strong spine at the angle of the preopercle, this usually grooved; interopercle short, armed with 1 to 4 strong spines. Dorsal fin with 12 to 15 strong spines, which are usually graduated, increasing in height to the last; soft dorsal moderate, with 17 to 20 rays, usually not ending in streamers. Coloration usually brilliant and well defined, the changes due to age less than in *Pomacanthus*; species numerous in all tropical seas, abounding about coral reefs. (ὅλος, whole: ἄκανθα, spine.)

a. Caudal subtruncate, its angles not produced in filaments, its color yellow
 b. Scales in lateral line 75 to 80: a rather narrow curved transverse whitish band behind base of pectorals its width much less than length of pectoral.
PASSER, 2097.
 bb. Scales in lateral line about 60; body olive brown, with a very broad orange area behind head, its width nearly equal to length of pectoral.
CLARIONENSIS, 2098.
aa. Caudal lunate, its angles produced in filaments: preorbital with a blunt spine; body mostly black, the head and tail yellow: scales rather larger, about 48.
TRICOLOR, 2099.

2097. HOLACANTHUS PASSER, Valenciennes.

Head 4; depth 2½. D. XIV, 17 or 18; A. III, 16 to 18; scales in lateral line 75 to 80. Scales subequal in size, the rows lengthwise and crosswise quite distinct. Ascending limb of preopercle armed only with small serræ; spine at angle of preopercle about 2½ in head; preorbital with 2 or 3 blunt points. Color dark purplish brown, crossed below the seventh spine by a whitish band attenuated and curved backward below; 4 nearly equidistant, indistinct, vertical, bluish lines across body between the white band and base of caudal; caudal margined with brown; dorsal and anal with 2 indistinct lines parallel with the borders; posterior margins also bluish; caudal [ventrals[*]], pectorals, and margin of anal yellow; head girdled with 2 distinct bluish bands, 1 in front of eyes, and 1 from front of dorsal and behind the eyes. (Gill.) West coast of tropical America: Cape San Lucas to the Galapagos Islands; rare. The form called *Holacanthus strigatus*, above described, is doubtless the young of *Holacanthus passer*. The latter is figured as without bluish markings on head or body, the dorsal and anal edged with yellow or brown, and its caudal plain yellow. (*passer*, a sparrow; the word also applied to certain flounders.)

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[*] "Dorsal" yellow in Gill's description is probably a slip for "ventrals."

Holacanthus passer, VALENCIENNES, Voyage Vénus, 327, pl. 6, 1846, Galapagos Archipelago; GÜNTHER, Cat., II, 46, 1860.
Holacanthus strigatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 243, Cape San Lucas.
Pomacanthus passer, EIGENMANN & HORNING, *l. c.*, 14, 1887.

2098. HOLACANTHUS CLARIONENSIS, Gilbert.

Head 4-; depth 1⅞; eye 4½ in head. D. XIV, 18; A. III, 18; scales 60 to 65, about 36 with pores. Eye small, little more than ½ snout, 1½ in interorbital width. Anterior profile very slightly concave above orbits, the snout not protruding; maxillary 4 in head; preopercular spine gently curved, its outer face channeled, the spine fitting into a groove in front of base of pectoral, 2½ in head, not reaching vertical from margin of opercle; vertical limb of preopercle with 20 to 25 short, strong spines, horizontal limb with 2 spines pointing backward; the anterior portion of margin of interopercle with 2 strong spines, from 1 to 3 smaller spines behind these; preorbital with a strong, compressed, blunt spine directed forward, and 2 sharp ones below it; posterior margin of subopercle with a series of short spines; no opercular spines; membrane of first dorsal spine free from scales, of second and third, partly scaly; other spines with membranes wholly scaled; length of fourteenth spine 2⅘ in head; soft dorsal and anal not produced, the angles rounded, the posterior margins inclined but slightly forward, and about on vertical of base of caudal; longest rays of dorsal and anal equal, 1¼ in head; caudal truncate when widely spread, the angles not rounded, the outer rays not at all produced, about equaling length of head; pectorals and ventrals about equal, equaling length of head; the ventrals with outer rays slightly produced, reaching to or slightly beyond vent. Scales large, everywhere covered with small basal accessory scales, all rough ctenoid; lateral line much arched, concurrent with the back, incomplete, ending under middle of soft dorsal, with only 35 pores. Head and body very dark olive brown, a wide orange red bar behind head, including nape and back as far as sixth dorsal spine, becoming narrow on middle of sides, and expanding again below to include region from gill openings nearly to vent, being here, however, darker and less distinctly defined; the yellowish color continues backward as a submarginal band on dorsal and anal, the margin being deep blue, broader posteriorly; caudal bright orange red, with very narrow blue margin; pectorals yellowish; ventrals yellowish olive; vertical fins otherwise with color of sides. Length about 7 inches. This brilliant species is extremely abundant at Clarion, Socorro, and San Benedicto islands of the Revillagigedo group.

Holacanthus clarionensis, GILBERT, Proc. U. S. Nat. Mus. 1890, 72, Revillagigedo Islands: Clarion, Socorro, and San Benedicto. (Coll. *Albatross.*)

2099. HOLACANTHUS TRICOLOR (Bloch).

(Rock Beauty; Catalineta; Vaqueta de dos Colores.)

Head 3½; depth 1⅔. D. XIV, 19; A. III, 18; scales 3–48–25. First dorsal spine 1⅓ in length of the last, which is 2½ in head; ascending limb of preopercle armed only with small serræ, the largest not more than $\frac{1}{15}$ the length of the large spine at the angle; angles of the caudal produced into filaments; preorbital with a distinct blunt spine; scales nearly uniform in size, the lengthwise and crosswise rows quite distinct. Color in life: head, anterior part of trunk, and caudal fin golden yellow; rest of body, snout, and chin black; dorsal, anal, and opercle edged with scarlet; orange on upper and lower ray of caudal; iris yellow, blue above and below. West Indies, north to Bermuda, south to Bahia; common; not known from the United States. (*tricolor*, three-colored—orange, yellow, and black.)

Catalineta, Parra, Descr. Dif. Piez. Hist. Nat. Cuba, 12, pl. VII, fig. 2, 1787, Cuba.
Chætodon tricolor, Bloch, Ichth., pl. 426, 1795.
Holacanthus tricolor, Lacépède, Hist. Nat. Poiss., IV, 525, 1803; Cuvier & Valenciennes, Hist. Nat. Poiss., VII, 162, 1831; Günther, Cat., II, 49, 1860; Poey, Memorias, II, 371, 1861; Poey, Enumeratio, 61, 1875; Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 125.
Genicanthus tricolor, Swainson, Class. Fishes, Amphibians, and Reptiles, II, 212, 1839.
Pomacanthus tricolor, Jordan & Gilbert, Synopsis, 941, 1883; Eigenmann & Horning, *l. c.*, 15, 1887.

662. ANGELICHTHYS, Jordan & Evermann.

(Isabelitas.)

Angelichthys, Jordan & Evermann, Check-List Fishes, 420, 1896 (*ciliaris*).

This genus is separated from *Holacanthus* by the presence on the ascending limb of the preopercle of several stout graduated spines in addition to the large grooved spine at the angle. The soft dorsal and anal are much falcate and the preorbital is without spine; interopercle armed with 1 to 4 spines; scales rather large; body ovate, rather deep, and compressed. The known species are among the largest of the Chætodonts and perhaps the most gaily colored of all. Species all American. (*ἄγγελος*, angel; *ἰχθύς*, fish.)

a. Spines on ascending limb of preopercle moderate, the longest less than ¼ length of the large spine at the angle.
  b. Nape with a blue ocellus; soft dorsal and anal edged with dark blue; depth 1⅞ in length in adult. CILIARIS, 2100.
  bb. Nape without distinct ocellus; no dark-blue edgings to soft dorsal and anal; body deep, the depth 1⅗ in length in adult. ISABELITA, 2101.
aa. Spines on ascending limb of preopercle very strong, the longest about ⅓ length of the long spine at the angle; no ocellus at nape; no blue edging to soft dorsal and anal; depth 1⅗ in length. IODOCUS, 2102.

2100. ANGELICHTHYS CILIARIS (Linnæus).

(Angel-fish; Isabelita.)

Head 3½; depth 1⅞; eye 4½ in head; snout 2½. D. XIV, 21; A. III, 21. Body oblong, oval; anterior profile straight, steep, sharply convex in front of dorsal; anterior dorsal outline and ventral outline nearly parallel;

jaws projecting. Length of head equal to its depth from anterior margin of blue ring in front of dorsal; the preorbital ⅓ broader than eye, with 1 or 2 indistinct spines; preopercle with a strong, grooved, slightly curved spine at angle, about as long as orbit; 5 or 6 short blunt spines with intermediate minute ones on upper limb, the longest of these spines 6 in the spine at the angle; 2 or 3 short strong spines on lower limb; interopercle with 1 or 2 short spines; premaxillary very thick, its width above equal to orbit; a furrow from front of eye below nostrils; interorbital greater than preorbital, equal to distance between eye and upper end of gill opening. Soft dorsal and anal falcate, the filamentous tips reaching much beyond the caudal; pectoral broad, obliquely rounded, 1⅖ in head; ventrals long, the spine long, 1⅔ in head, the rays slightly filamentous, not quite reaching anal, equal to head; caudal rounded, equal to head behind premaxillary; lateral line ceasing before reaching end of dorsal, the scales below regularly arranged, those above irregularly. Ground color olive, terminal half of scales on sides yellow, side of head yellowish olive, top of head dusky; a blue ring in front of dorsal surrounding a black spot containing a few pale-blue specks; iris yellow, blue above and below; upper jaw blue black, some yellow at corner of mouth; lower jaw, lower side of head, and breast dusky olive; a dark blue margin to opercle much broader above than below; upper edge of preopercular spine pale blue; edge of dorsal fin blue black, a black blotch on last rays, the fin otherwise reddish or orange, becoming paler toward tip of filament; anal similar to dorsal, but darker; caudal entirely pale orange or clear lemon yellow; pectoral lemon yellow, the base with a brown blotch bordered anteriorly by a narrow blue stripe; ventrals lemon yellow, somewhat dusky at base. West Indies; common. Here described from specimens from Jamaica. A large showy fish. (*ciliaris*, with eyelashes, referring to the produced fins.)

Angel-fish, Catesby, Nat. Hist. Carolina, etc., 1737.
Isabelita, Parra, Dif, Piezas, etc., 1787, Cuba.
Chætodon ciliaris, Linnæus, Syst. Nat., Ed. x, 276, 1758, Indies; in part; Bloch, Ichth., pl. 214, 1787.
Chætodon squamulosus, Shaw, Naturalists' Miscellany, 275, 1789–1813; after Angel-fish of Catesby.
Chætodon parræ, Bloch & Schneider, Syst. Ichth., 235, 1801, Cuba; after Isabelita of Parra.
Holacanthus cornutus, Desmarest, Décade Ichthyologique, 44, pl. 3, fig. 3, 1823, Cuba.
Holacanthus formosus, Castelnau, Anim. Nouv. ou rares de l'Amer. du Sud, Poissons, 19, pl. 2, fig. 2 1855, Bahia; Günther, Cat., ii, 47, 1860.
Holacanthus ciliaris, Lacépède, Hist. Nat. Poiss., iv, 527, 1802; Cuvier & Valenciennes, Hist. Nat. Poiss., vii, 154, 1831; Poey, Memorias, ii, 371, 1861; Günther, Cat., ii, 46, 1860; Poey, Synopsis, 351, 1868; Lütken, Spolia Atlantica, 200, 1880.
Pomacanthus ciliaris, Jordan & Gilbert, Synopsis, 615, 1883.
Angelichthys ciliaris, Jordan & Evermann, Check-List Fishes, 421, 1896; Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 125.

2101. ANGELICHTHYS ISABELITA, Jordan & Rutter, new species.

(Angel-fish.)

Head 3⅖; depth 1⅗; eye 3½ in head (young); snout 2⅞. D. XIV, 18; A. III, 19. Body nearly oval, anterior profile very steep, much steeper than in *Holacanthus ciliaris*, the lips not projecting; length of head scarcely greater than its depth below top of eye; preorbital ¾ as broad as eye, without any indication of a spine; preopercular spine strong, ⅘ length of eye, 3¾ in head, 3 or 4 very short stout spines on upper limb, the longest about 5 in spine at angle, 1 on lower limb; 1 spine on interopercle; premaxillary not very broad on top, very protractile, not projecting beyond anterior profile; interorbital greater than preorbital, equal to distance between eye and upper end of gill opening; furrow in front of eye indistinct; dorsal and anal falcate, the filamentous tips reaching much beyond caudal; pectoral obliquely rounded, equal to head, the lower rays very short; ventral spine $1\frac{3}{7}$ in head, the filamentous rays reaching origin of anal, about ⅕ longer than head; caudal rounded, longer than head, but shorter than ventral, lateral line ceasing before reaching end of dorsal, the scales below regularly arranged, those above nearly so. Color in life, yellowish brown on sides, each scale with a darker or orange spot; back shaded with violet, which grows brighter and merges into intense sky blue along the edges of spinous dorsal and on the region before the dorsal; scales of dorsal region with brown spots like those on sides; head paler; the upper lip yellowish; lower jaw reddish; spines of preopercle and edge of opercle very bright sky blue; iris yellow, marked above and below by blue; a blue bar extending from in front of first dorsal spine halfway to eye; breast sky blue; pectoral sky blue at base, then broadly golden, its edge pale; ventrals golden; posterior edge and produced lobes of dorsal and anal golden yellow, caudal broadly edged with yellow; no distinct ocellus at nape, and no dark-blue edgings to soft dorsal and anal. This species is closely related to *Angelichthys ciliaris*, but differs decidedly in the color markings, especially those of the nape and dorsal, in the great depth of the head, and in the nonprojecting mouth; also somewhat in general contour of body. Florida Keys and probably neighboring waters; common; reaching a large size. This description is based on the type, a single specimen 4¼ inches long, from Key West, Florida, collected by Dr. Jordan. (*Isabelita*, the Spanish name.)

Pomacanthus ciliaris, EIGENMANN & HORNING, Ann. N. Y. Ac. Sci. 1887, 15; not of authors.
Angelichthys isabelita, JORDAN & EVERMANN, Check-List Fishes, 420, 1896; name only. (Type, No. 363, L. S. Jr. Univ. Mus. Coll. Dr. Jordan.)

2102. ANGELICHTHYS IODOCUS, Jordan & Rutter.

Head 3⅖; depth 1⅗ (2 in total); eye 4⅕. D. XIV, 20; A. III, 20. Body very deep, forming almost a regular ellipse, slightly concave above and in front of eye. Preorbital without spine, shorter than width of interorbital, which is narrower than distance between eye and upper end of gill opening; spine at angle of preopercle straight, longer than orbit, about equal to preorbital; 8 or 9 spines on upper limb of preopercle, these nearly ½ as long as the one at angle, very much longer than in *Angelichthys ciliaris;* 2 weak spines on lower limb, and 2 on interopercle. Soft dorsal and anal falcate, the longest rays filamentous; pectoral very obliquely rounded, the lower rays scarcely ⅓ as long as the upper, which are 1¼ in head; ventral slightly filamentous, equal to head. Lateral line regularly arched, but approaching the dorsal outline posteriorly, ceasing before reaching end of dorsal. Scales below lateral line regularly arranged, those above irregular. Color in alcohol, uniform gray (probably orange in life); scales edged with silvery; a very faint, narrow, black or dark-blue edge to dorsal anterior to filament; terminal half of pectoral, ⅓ of caudal, and tips of dorsal and anal behind and including the falcate lobes yellow; no blue on concavity of dorsal and anal; lips pale; edge of opercle dark blue; a faint indication of a dark blotch in front of dorsal; no blue-black blotch on base of pectoral. This species differs from *Angelichthys ciliaris* in the form of the body, in color, and especially in the very long spines on the upper limb of preopercle. A single specimen, 9 inches long, from the Galapagos Islands, collected by United States Fish Commission steamer *Albatross*. (*ἰοδόκος*, a sheaf of arrows, from the bristling preopercle.)

Holacanthus iodocus, JORDAN & RUTTER, in Gilbert, Proc. U. S. Nat. Mus. 1896, 445, Galapagos Archipelago (Type, No. 47747, U. S. Nat. Mus. Coll. *Albatross*); JORDAN & EVERMANN, Check-List Fishes, 421, 1896; name only.

Family CLXVI. ZANCLIDÆ.

(THE MOORISH IDOLS.)

Body oblong, much compressed and elevated, covered with minute rough scales. Mouth small, with long, slender, brush like teeth; no teeth on the palate; bones of top of head thick and solid, developing with age a conspicuous median horn on the forehead, wanting in the young. Preopercle unarmed. Dorsal single, with 7 spines, the third and succeeding spines prolonged into long filaments; interspinal bone projecting before dorsal. Anal similar to soft dorsal, long, with its anterior rays produced; a small antrorse spine before anal. Caudal peduncle unarmed, the fin lunate; pectorals short; ventrals pointed. Intestine long. Coracoid bones largely developed. Vertebræ reduced in number, $9+13=22$. Air bladder large. Branchiostegals 4; pyloric cæca 14. One species, widely distributed about rocky islands of the Pacific. (Genus *Zanclus*, Günther, Cat., II, 492–494, 1860.)

663. ZANCLUS, Cuvier & Valenciennes.

Zanclus (COMMERSON) CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 102, 1831 (*cornutus*).
Gonopterus, GRONOW, Cat. Fish., Ed. Gray., 77, 1854 (*mœrens*).
Gnathocentrum, GUICHENOT, Ann. Maine et Loire, IX, 4, 1866, (*centrognathum*); young.

Characters of the genus included above. (*ζάγκλον*, a sickle.)

2103. ZANCLUS CORNUTUS (Linnæus).

(MOORISH IDOL; BESAN; PIQUIER; PORTE ENSEIGNE.)

Head 2⅗; depth about as great as length; eye 2½ in snout. D. VII, 38; A. III, 33; snout 1½ in head, greatly produced, the upper profile very concave; horn on forehead well developed, wanting in young; teeth slender, brush-like, very much projecting. Anterior rays of dorsal and anal produced; first and second dorsal spines very short, the third greatly produced, ending in a long filament exceeding total length of fish; the longest soft ray about 1⅓ in body; posterior dorsal rays short, vertical or even inclined forward; pectoral some longer than snout, about equal to ventrals. Color in life, snout chiefly white, point of upper jaw black, followed by a large orange patch separated from the white by a narrow black band; lower jaw mostly black; anterior part of body from first dorsal spine to ventrals black, this crossed by 2 narrow vertical blue lines, the first beginning at origin of ventrals, extending upward and forward, then backward just behind orbit, and ending on median line of back in front of dorsal fin; the second beginning on abdomen, crosses body at base of pectoral and ends at origin of dorsal fin; a third less distinct one extends upward and backward from eye; a broad whitish bar, nearly as broad as length of head, begins on anterior part of dorsal fin and crosses body somewhat obliquely backward, covering anterior portion of anal fin; posteriorly this bar is washed with yellow or orange, which gradually fades into the white of the anterior part; next comes a black bar ½ as wide, covering the bases of about 14 dorsal rays and widening out upon the anal so as to cover the greater part of about 24 rays; in the posterior part of this black band is a narrow white line; next a yellow or orange band covering all of the caudal peduncle and the posterior portions of the dorsal and anal fins; caudal fin black, a narrow white line at base; tip of caudal fin with a crescent-shaped border of white more or less washed with yellowish; pectorals pale; ventrals black. East Indies and islands of Polynesia; common and widely distributed; ranging east to the Revillagigedo Archipelago. (Gilbert; McGregor.) Not taken elsewhere on our coast. (*cornutus*, horned.)

? *Chætodon canescens*, LINNÆUS, Syst. Nat., Ed. x, 272, 1758, Indies; after ARTEDI; young.

Chætodon cornutus,* LINNÆUS, Syst. Nat., Ed. x, 273, 1758, Indies; after ARTEDI; adult; LACÉPÈDE, Hist. Nat. Poiss., IV, 473, pl. 2, fig. 1. 1803.

Zanclus centrognathus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 528, 1831, near Equator, 75° E.

Gonopterus mœrens, GRONOW, Cat. Fishes, Ed. Gray, 77, 1854, India.

Zanclus cornutus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VII, 102, pl. 177, 1831.

? *Zanclus canescens*, GÜNTHER, Cat., II, 493, 1860.

Family CLXVII. TEUTHIDIDÆ.

(THE SURGEON-FISHES.)

Body oblong, compressed and usually elevated, covered with very small scales; lateral line continuous. Tail armed with 1 or more spines or bony plates. Eye lateral, high up; preorbital very narrow and deep. Nostrils

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*According to Bleeker, our species, which is *Zanclus cornutus*, is distinct from *Zanclus canescens*, differing in the absence of the preopercular spine, in the longer head (3 in total length), and in the presence of a large black fenestrated spot below eye and on snout. Bleeker's figure shows a black streak from forehead to tip of snout, with a black streak running horizontally backward toward eye, then upward to join the first, thus forming on each side of snout a right-angled triangle inclosing a triangular patch of the ground color. These black marks are wanting in *Zanclus canescens*. According to other authors, *Zanclus canescens* is the young and *Zanclus cornutus* the adult of the same species, the name *canescens* having precedence. The above description is from specimens taken at Honolulu.

double. Mouth small, low; each jaw with a single series of narrow incisor-like teeth; vomer and palatines toothless; premaxillaries somewhat movable, but not protractile; maxillary short, closely united with the premaxillary; gill rakers obsolete; pseudobranchiæ large; gills 4, a slit behind the fourth; gill membranes attached to the isthmus, the openings thus restricted to the sides. A single dorsal fin, with strong spines, the spinous part of the fin shorter than the soft part; anal fin similar to soft dorsal; pectorals moderate; ventral fins present, thoracic, mostly I, 5 (never I, 4, I, as in *Siganidæ*). Pelvis bones long, narrow, curved, closely connected, evident through the skin, as in *Balistidæ*, with which group the *Teuthididæ* have the closest affinities. Pyloric cæca rather few; air bladder large; intestinal canal long. Vertebræ 9 + 13 = 22. Posterior suborbital bones in close contact with the preopercle; post-temporal immovably united with the skull, apparently simple, but really trifurcate with the interspaces filled in with bone, the foramen not passing through it; interneural bones with transversely expanded buckler-like subcutaneous plates, which intervene between the spines and limit their motion forwards; epipleurals developed from the ribs. Herbivorous fishes of the tropical seas; genera 5 or more; species nearly 80, most of them belonging to *Teuthis*. These fishes undergo large changes with age, as is the case with the *Chaetodontidæ*, the young having often been described as distinct genera. (*Acronuridæ*, Gunther, Cat., III, 356, 1861)

a. Caudal armature developed as a movable antrorse, extremely sharp, knife-edged spine, erectile from a groove.
  b. Ventral rays I, 5; teeth fixed and strong; dorsal spines usually 9. TEUTHIS, 664.
aa. Caudal armature developed as immovable tubercles or lamina.
  c. Ventrals I, 5; anal spines 5; dorsal spines usually 8; caudal plates 3 to 6. XESURUS, 665.

664. TEUTHIS,* Linnaeus.

(DOCTOR-FISHES.)

Rhombotides, KLEIN, Missus (nonbinomial).
Hepatus, GRONOW, Zoophyl., 1765 (*hepatus;* nonbinominal).
Teuthis, LINNÆUS, Syst. Nat., Ed. XII, 507, 1766 (*hepatus; javus;* after *Hepatus*, GRONOW).
Acanthurus, FORSKÅL, Descr. Anim., 59, 1775 (*Chætodon unicornis*).
Harpurus (FORSTER) GMELIN, Syst. Nat., I, 1269, 1788.
Aspisurus, LACÉPÈDE, Hist. Nat. Poiss., IV, 556, 1802 (*sohar*).
Theuthis, CUVIER, Tab. El. Hist. Nat., 371, 1798.
Theutis, CUVIER, Règne Animal, Ed. 1, II, 330, 1817 (restricted to *Les Acanthurus;* allies of *Teuthis hepatus*).
Teuthys, SWAINSON, altered orthography.
Rhombotides (KLEIN) DAY, Fishes India, I, 202, 1876.
Acanthurus, of authors generally.

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* See Meek & Hoffman, Proc. Ac. Nat. Sci. Phila. 1884, 227-231, for the synonymy of the American species of this genus, and Gill. Proc. U. S. Nat. Mus. 1884, 275, for the full synonymy of the genera of this family and of the *Siganidæ*.

The name *Teuthis* has been transferred by Cantor and Günther to the type of *Teuthis javus*, the genus called *Siganus*, by Forskål, and *Amphacanthus*, by Bloch & Schneider. The application of the laws of nomenclature here offers some difficulties, as the name *Teuthis* was neglected by most followers of Linnæus. Apparently, Dr. Gill is right in applying the name to the present genus in place of *Acanthurus*.

This genus includes those *Teuthididæ* which have the tail armed with a sharp, antrorse, lancet-like, movable spine; strong, fixed, incisor teeth; ventral rays, I, 5, and usually 9 spines in the dorsal fin. The numerous species are found in all tropical seas; herbivorous fishes, living about coral reefs; the adult protected by the murderous caudal spine, which grows larger with age. (*τευθίς*, the Squid, *Loligo;* substituted by Linnæus for Gronow's name, *Hepatus*, for no evident reason.)

a. Caudal spine small; species pale, barred with black. TRIOSTEGUS, 2104.
aa. Caudal spine strong; species not pale, barred with black.
  b. Dorsal and anal without yellow streak, widened behind on dorsal and anal.
    c. Outline rhomboid, the depth $1\frac{1}{2}$ in length, color brown, washed with deep blue. CÆRULEUS, 2105.
    cc. Outline ovate, the depth about 2 in length; color brown, never blue.
      d. Caudal simply lunate. HEPATUS, 2106.
      dd. Caudal deeply emarginate.
        e. Upper lobe of caudal not filamentous. CRESTONIS, 2107.
        ee. Upper lobe of caudal produced in a filament. BAHIANUS, 2108.
  bb. Dorsal and anal with a yellow streak broadened behind; a flesh-colored crescent under eye. ALIALA, 2109.

2104. TEUTHIS TRIOSTEGUS (Linnæus).

Head $3\frac{2}{5}$; depth $1\frac{5}{6}$; eye $2\frac{1}{2}$ in snout. D. IX, 23; A. III, 21. Body ovate, anterior profile gently curved, most convex over eyes; snout somewhat produced, concave above. Dorsal fin moderate, anterior spines more or less concealed in the skin, the longest spines about $1\frac{1}{4}$ in snout, the soft rays shorter; first anal spine very short, the third longest, about equal to longest dorsal spines; soft portion of anal about as high as the third anal spine; caudal slightly lunate, the lobes but little produced; pectorals about as long as head; ventrals as long as snout. Color in life, dark greenish or slaty above, with yellowish cloudings; chin, belly, throat, and a narrow strip along base of anal, white; vertical fins dusky; anal with a narrow white margin; pectorals plain; ventrals white on under surface; sides with 5 black bars each about as wide as pupil, the first, beginning just in front of the branchiostegals, extends upward and backward across cheek, through eye and to median line of back, where it meets its fellow from the other side; the second begins at front of dorsal fin and extends downward to base of pectoral from which point it is continued downward in a narrower line beginning on base of pectoral and ending just above base of ventral; the third begins near base of sixth dorsal spine and extends across side to belly at a point midway between anus and beginning of anal fin; the fourth begins on base of first dorsal ray and extends to first anal ray; the fifth begins at base of seventh dorsal ray and extends across side to base of fifth anal ray; a black spot on upper side of caudal peduncle. Pacific Ocean; very abundant about rocky islands from New Zealand and Australia to the Hawaiian Islands and the Revillagigedos; not yet found elsewhere in American waters; our specimens from Clarion and Socorro islands. (*triostegus*, *τρεῖς*, three; *στέγω*, to cover.)

Chætodon triostegus, LINNÆUS, Syst. Nat., Ed. x, 274, 1758, India.
Harpurus fasciatus, FORSTER, Descr. Anim., Ed. Licht., 216.
Chætodon zebra, LACÉPÈDE, Hist. Nat. Poiss., III, 25, fig. 3, 1800, no locality.
Acanthurus zebra, LACÉPÈDE, Hist. Nat. Poiss., IV, 546, pl. 6, fig. 3, 1802, no locality.
Chætodon couaga, LACÉPÈDE, Hist. Nat. Poiss., IV, 727, 1802, no locality.
Acanthurus hirundo, BENNETT, Ceylon Fishes, 11, pl. 11, 1830, Ceylon.
Teuthis australis, GRAY, in King's Narr. Survey Coast of Australia, II, 435. 1826.
Acanthurus subarmatus, BENNETT, Whaling Voyage, II, 278, 1840, Society Islands.
Acanthurus triostegus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., x, 197, 1835; GÜNTHER, Cat., III, 327, 1861.

2105. TEUTHIS CÆRULEUS (Bloch & Schneider).

(BARBERO; BLUE SURGEON; BLUE TANG.)

Head 3¼; depth 1½. D. IX, 27; A. III, 24. Body rhomboid, the anterior profile subvertical, nearly straight, making an angle of about 60° with axis of body. Caudal deeply emarginate, its lobes subequal, the middle rays ⅗ length of outer. Color deep blue, or rather brown, washed with deep blue; body with undulating longitudinal pale-blue streaks, no dark cross bars; vertical fins blue with oblique bronze streaks; lips and caudal spine yellow; edge of caudal black; pectorals yellow; young with the blue shades obsolete. West Indies; generally common from Key West and Bermuda to Bahia. (*cœruleus*, blue.)

Turdus rhomboidalis, CATESBY, Nat. Hist. Carolina, etc., 1742, based in part on BLOCH.
Acanthurus cœruleus, BLOCH & SCHNEIDER, Syst. Ichth., 214, 1801, after CATESBY, PARRA and BROWNE, Carolina, Havana, Jamaica; CUVIER & VALENCIENNES, Hist. Nat. Poiss., x, 179, 1835; GÜNTHER, Cat., III, 336, 1861.
Acanthurus brevis, POEY, Memorias, II, 207, 1860, Antilles and Havana.
Acanthurus broussonetii, DESMAREST, Prem. Dec. Ichth., 26, 1823, Cuba.
Acronurus cœruleatus, POEY, Enumeratio, 69, 1875, Cuba; young.
Teuthis cœruleus, MEEK & HOFFMAN, *l. c.*, 228, 1884.

2106. TEUTHIS HEPATUS, Linnaeus.

(COMMON SURGEON; DOCTOR-FISH; LANCET-FISH; BARBER; TANG; SAIGNEUR; BARBERO.)

Head 3½; depth 2. D. IX, 26; A. III, 24. Form ovate; anterior profile moderately convex, forming an angle of 45° with axis of body. Caudal simply lunate, its inner rays about ⅔ length of outer rays; caudal lobes subequal, the upper never filamentous. Color dark olive brown, more or less distinctly greenish; middle of sides paler; sides with about 12 distinct blackish vertical bars, rather narrower than the interspaces, most distinct over front of anal; a brownish stripe along base of dorsal; spinous dorsal with alternate stripes running upward and backward, of dark blue and bronze olive, the two colors of about equal width; soft dorsal with a bluish streak on the anterior side of each ray, and a bronze stripe behind it; fins very dark, often almost black. West Indies; common from Florida to Bahia. This is the most abundant species of the genus, being apparently common throughout the West Indies, and certainly so at Key West and Cuba; ranging northward perhaps as far as Charleston, doubtless not to New York, where it is reported on the authority of the confused collection of Milbert. (*hepatus*, an old name of some fish, from *hepas*, liver.)

Teuthis hepatus, LINNÆUS, Syst. Nat., Ed. XII, 507, 1766, Carolina; after *Hepatus mucrone reflexo*, GRONOW.

Chætodon chirurgus, BLOCH, Ausl. Fisch., 99, pl. 208, No. 24, 1784, Martinique; on a drawing by PLUMIER.

Acanthurus hepatus, BLOCH & SCHNEIDER, Syst. Ichth., 211, 1801; in part, not of later writers.

Acanthurus phlebotomus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., X, 176, 1835, Martinique, Brazil, Havana, New York; POEY, Repertorio, I, 256, 1867; POEY, Synopsis, 245, fig. 7, 1868.

Acronurus fuscus, GRONOW, Cat. Fishes, Ed. Gray, 119, 1854 (same type as *T. hepatus* L.)

Acronurus carneus, POEY, Memoiras, II, 207, 1860, Cuba; young.

Acanthurus chirurgus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., X, 168, 1835; GÜNTHER, Cat., III, 329, 1861; POEY, Synopsis, 355, 1868; JORDAN & GILBERT, Synopsis, 617, 1883.

Acanthurus nigricans, JORDAN & GILBERT, Synopsis, 941, 1883; not *Chætodon nigricans*, Linnæus, from the Red Sea.

Teuthis hepatus, MEEK & HOFFMAN, *l. c.*, 229, 1884.

2197. TEUTHIS CRESTONIS, Jordan & Starks.

(BARBERO NEGRO.)

Head $3\frac{1}{3}$; depth $1\frac{5}{6}$. D. IX, 26; A. III, 24; snout $1\frac{2}{3}$ in head; eye $3\frac{1}{3}$; pectoral equal to head; caudal $\frac{1}{5}$ longer than head; longest dorsal spine equaling longest soft ray, $1\frac{1}{2}$ in head; ventral $1\frac{1}{5}$ in head. Body deep and compressed, the anterior profile steep, convex before eye; caudal lunate, the upper ray $\frac{1}{3}$ longer than middle one, ventrals very long. Body slaty brown, mottled with gray but without bands; dorsal with a bluish gray band at base, then a bronze one, forking on soft dorsal, inclosing a bluish gray band; 5 gray bands and 4 bronze ones on dorsal more or less distinct, especially in young; anal with 5 bluish gray and 5 bronze bands more oblique than those on dorsal and hence not continuous the whole length of fin; caudal peduncle black, a whitish yellow cross band behind spine, faint in adult, the anterior margin vertical, the posterior concave; rest of caudal black; pectoral yellowish; ventrals dusky, the spine black. Adult with the pectoral quite yellow; pale band at base of caudal growing faint with age; a blue streak along base of dorsal. Length 8 to 10 inches. Rocky shores on the west coast of Mexico from Mazatlan to Panama; common at Mazatlan. Also obtained by Dr. Gilbert in 1881 at Mazatlan and Panama. These specimens having been destroyed by fire, have never been described, and were provisionally and incorrectly referred to the West Indian species *Teuthis tractus* (*bahianus*), from which this species differs in a few respects. (Named for Creston * Island, a commanding peak in the harbor of Mazatlan at the base of which this species abounds.)

Teuthis crestonis, JORDAN & STARKS, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 485, pl. 47, Mazatlan. (Type, No. 2899, L. S. Jr. Univ. Mus. Coll. Hopkins expedition to Sinaloa.)

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* "Beyond the headland with its palm tree lone
Flashes the beacon light on tall Creston;
The last and haughtiest of the craggy horde,
Sierra Madre sends forth oceanward."

2108. TEUTHIS BAHIANUS (Castelnau).

(BARBEIRO; OCEAN TANG.)

Head 3½; depth 2. D. IX, 24; A. III, 22. Outline ovate; anterior profile moderately convex, making angle of 45° with axis of body. Caudal deeply emarginate, its upper lobe much the longer, in adult slender and usually produced into a filament, the inner rays ⅗ length of outer rays (in adult). Color dark brown, blotched with paler below, no transverse bars; brown, wavy, longitudinal streaks on sides of body; 8 dark lines running parallel with edge of dorsal fin for its whole length and separated by interspaces of same width; margin of caudal fin bluish with a violet base; no distinct dark cross bar at base of caudal. Length 1 foot. West Indies and neighboring coasts of tropical America from Key West to Bahia; the adult easily known from related species by the form of the caudal, the young by the fin rays and the markings; our specimens from Key West and Bahia. (Name from Bahia.)

Acanthurus bahianus, CASTELNAU, Anim. nouv. ou Rares de L'Amer. du Sud, 24, pl. 11, fig. 1, 1855, Bahia; JORDAN, Proc. U. S. Nat. Mus. 1890, 323.

Acanthurus tractus, POEY, Memorias, II, 208, 1860, Cuba; POEY, Repertorio, 356, 1867; JORDAN & GILBERT, Synopsis, 941, 1883.

Acronurus nigriculus, POEY, Enumeratio, 69, 1875, Cuba; larval form.

Acanthurus matoides, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 626; not of CUVIER & VALENCIENNES.

Teuthis tractus, MEEK & HOFFMAN, *l. c.*, 229, 1884.

2109. TEUTHIS ALIALA (Lesson).

(PHILOSOPHE.)

Head 3⅔; depth 1¾ to 1⅘; eye 3½; maxillary 4⅙ in head. D. IX, 30; A. III, 26; from eye to corner of mouth 1¼ in head; gill opening 1⅕ in head; opercle short and obliquely set, 4½ in head; humeral bone striate. Body ovate, strongly compressed, closely covered with small rough scales which become shagreen-like on head; lateral line present but obscure; anterior profile strongly convex above and before the eye, thence somewhat concave and nearly vertical to the small projecting mouth. Teeth broad, digitate, each with 4 or 5 claw-like serræ at tip; lower teeth with the serræ much smaller, forming notches. Jaws very short, about equal, about 10 incisors in each. Anterior nostril moderate; close to posterior, which is much smaller. Dorsal and anal low, continuous, rounded behind; longest dorsal ray near end of fin, 2⅕ in head; longest anal ray 2 in head; caudal lunate, upper and lower angles produced, but acuminate and short, middle rays 1⅓ in head, the outer 1 in head; caudal spine very strong, 2⅕ in head, attached near its posterior end, the short sharp posterior end free, the long knife-like anterior portion slipping into a groove in the flesh; pectoral long, ¼ longer than head; ventrals 1⅙ in head. Color dark purplish brown, almost black; a pale-yellowish or flesh-colored crescentic area under eye; a ring of pearly whitish around mouth, not quite continuous above; a pale streak along dorsal fin, widening behind into a pale-orange patch, occupying ⅔ of height of last ray; base of last ray dusky; anal marked in the same way as the soft dorsal; a very narrow pale edge to soft parts of dorsal and anal; pectoral black; caudal abruptly pale at end of black caudal peduncle, with a curved dark streak parallel with edge of fin and nearly the diameter of the eye behind it; behind this a diffuse yellow area parallel with the dark streak; fin behind with a narrow pale edging; flap of opercle narrowly pale. East Indies to west coast of Mexico; taken in abundance on Socorro and Clarion islands by Mr. Richard C. McGregor. Our specimens above described seem to agree in all respects with accounts of the East Indian species. (*ikan-ali-ala*, its name at the island of Oualan.)

Acanthurus aliala, LESSON, Voyage Coquille, Zool., II, 150, 1830, Oualan. (Coll. Lesson & Garnot.)

Acanthurus glaucopareius, CUVIER & VALENCIENNES, Hist. Nat. Poiss., X, 190, 1835, Oualan; Molucca (after *Harpurus glaucopareius*, FORSTER, unpublished drawing of specimen from Otaheite, called *Harpurus nigricans* by BLOCH & SCHNEIDER); GÜNTHER, Cat., II, 339.

665. XESURUS, Jordan & Evermann.

Xesurus, JORDAN & EVERMANN, Check-List Fishes, 421, 1896 (*punctatus*).

Teeth in 1 row, each 5-lobed; caudal peduncle armed with 3 large bony plates, placed in a right line, each one with a bluntish, nonserrated keel. This genus is close to the East Indian genus, *Prionurus* Lacépède, differing chiefly in the character of the caudal armature, the plates in *Prionurus* being small, sharper, and in greater number. (ξέσις, scraping; *οὐρά*, tail.)

a. Body very deep, the depth in adult 1⅗ in length; body and fins everywhere covered with round blackish spots; caudal plates with elevated keel (in the male), surrounded by smaller tubercles. PUNCTATUS, 2110.
aa. Body not very deep, not covered with blackish spots.
  b. Body ovate, the depth 2 in length; coloration nearly uniform. CLARIONIS, 2111.
  bb. Body oblong, the depth 2½ in length; a broad brown lateral band. LATICLAVIUS, 2112.

2110. XESURUS PUNCTATUS (Gill).

(COCHINITO.)

Head 4; depth 1⅗. D. VII, 26, or VIII, 26; A. III, 23; V. I. 5; snout 1⅓ in head; eye 5⅓; pectoral long as head; ventral 1⅔ in head; caudal 1⅙; second dorsal spine 2 in head. Adult (of 16½ inches): Body deep, compressed, covered with fine velvet; anterior profile concave before eye, then convex, the short conic snout projecting, lower jaw included. Preopercle obliquely placed, its bony edge slightly roughened. Caudal with 3 stout, compressed, blunt spines, with broad bases, the tips turned upward, the spines whitish, with black bases. Some specimens, probably females, with no other spines; others, probably males, with many spines, similar in form but much smaller, scattered over posterior half of body, most numerous about the other spines, these black in color. Young with 3 small blunt laminæ only. Gill rakers extremely small and weak. Caudal evenly lunate; pectoral not falcate. Teeth $\frac{8}{6}$ on each side, incisor-like, lobate.

Color of adult, olive green, slightly paler below, everywhere evenly covered with small, round, black spots, close set but not confluent, the largest about equal to nostril; caudal peduncle and fin abruptly bright yellow, unspotted; other fins colored like the body and similarly spotted, the spots more sparse; vertical fins dusky-edged, the spots fewer on the edge. Young, light steel blue or gray, paler below; a triangular silvery patch on breast and opercles; caudal fin canary yellow, sometimes white, clouded at base; second dorsal and anal black, a dark bar from nape through eye; snout dusky; small dark spots everywhere on body, these sometimes so numerous as to reduce the ground color to reticulations. Rocky places on the Pacific coast of Mexico; reaching a length of 18 inches; the young of 1 or 2 inches in length abundant in rock pools about Cape San Lucas and Mazatlan. The adult taken by us about Creston Island and by Dr. Gilbert about the Revillagigedos and Cape San Lucas. (*punctatus*, spotted.)

Prionurus punctatus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 242, Cape San Lucas; young. (Coll. John Xantus.)
Xesurus punctatus, JORDAN, Fishes of Sinaloa, 486, pl. 46, 1895.

2111. XESURUS CLARIONIS, Gilbert & Starks.

Head 3½ in length to base of caudal; depth 2. D. VII, 26; A. III, 22; eye 3 in snout; pectoral 4 in length; ventral 7. Profile undulating; concave on snout and above eyes, produced before eyes and at occiput; occiput forming a well-rounded angle, behind which the curve of the back is uniform to the caudal peduncle. Teeth in a single row, alike in both jaws, wide and flat outer margin oblique, divided into 5 rounded lobes; lower jaw included; gill opening equal in length to pectoral; first dorsal spine ⅔ as long as the others, which are subequal; ventral spine extending to middle of vent, ½ length of soft rays; upper rays of pectoral produced, the fin somewhat acute at tip; posterior margin of pectoral concave; anal slightly higher than soft rays of dorsal but similar in outline. Body, head, and fins everywhere with a villous covering; 3 large bony plates near tail, not with recurved spines in our specimens. Color in alcohol, uniform dark brown, often finely mottled with darker in life, the caudal dark yellowish. Numerous specimens 15 inches long, obtained by Dr. Gilbert (*Albatross* Coll.), at Clarion Island in the Revillagigedo Archipelago. This species is much deeper than *Xesurus laticlavius*, as shown in the figure given by Valenciennes, and shows no lateral band, but it may be the adult of the same species.

Xesurus clarionis, GILBERT & STARKS, Proc, U. S. Nat. Mus. 1896, 445, pl. 51, Clarion Island.

2112. XESURUS LATICLAVIUS (Valenciennes).

Head 4; depth 2½; eye 4; snout 1⅓. D. VII, 27 (VIII, 28); A. III or IV, 23. Snout much produced, anterior profile below eye concave, between eye and dorsal fin convex; 3 plates on median line of caudal peduncle, of nearly uniform size; 8 incisors on each side of upper jaw. Color yellowish or orange, a broad band of darker or brownish extending from gill-opening to base of caudal fin, narrowing toward posterior end; body profusely covered with fine darker punctulations; fins all pale orange. (Description from Valenciennes's plate, which may incorrectly represent *Xesurus punctatus.*). Galapagos Islands; only the type known. (*latus* side; *clavis,* stripe.)

Prionurus laticlavius, VALENCIENNES, Voyage Vénus, 335, pl. 7, fig. 2, 1846, Galapagos Islands; GÜNTHER, Cat., III, 347, 1861.

Group PLECTOGNATHI.

(THE PLECTOGNATHOUS FISHES.)

One of the most important offshoots of the *Acanthopteri* is the group or order *Plectognathi,* including the 3 suborders of *Sclerodermi, Ostracodermi,* and *Gymnodontes.* The extremes of this group show a remarkable divergence from the usual type of spiny-rayed fishes. The more generalized forms are, however, very close to the group called *Squamipinnes,* and especially to the family of *Teuthididæ.* There can be no doubt of the common origin of *Balistidæ* and *Teuthididæ* and that the divergence is comparatively recent. The close connection of these groups leads us to subordinate the *Plectognathi* to the *Acanthopteri* and to place its 3 suborders in their natural position as an offshoot from the *Squamipinnes.* The *Plectognathi* may be thus defined: *

Scapula suspended to the cranium by a post-temporal which is short, undivided, and anchylosed to the epiotic. Premaxillaries usually coossified with the maxillaries behind and the dentary bones with the articular; interopercle a slender rod; lower pharyngeal bones distinct; upper pharyngeals laminar, usually vertical and transverse; skin usually with rough shields or scales or bony plates; skeleton imperfectly ossified, the number of vertebræ usually small, typically less than 24 (usually 14 to 20); rarely considerably increased. Gill-openings restricted to the sides; ventral fins reduced or wanting, the pelvic bones usually elongate. Spinous dorsal small or wanting; air bladder without duct. Fishes chiefly of the tropics, mostly inactive and depending on their tough skin or bony or spinous armature for their protection. (*πλεκτός,* braided or joined; *γνάθος,* jaw.)

Suborders of PLECTOGNATHI.

a. Jaws with distinct teeth.
  b. Spinous dorsal present; body with scales or movable plates. SCLERODERMI.
  bb. Spinous dorsal wanting; body encased in an immovable carapace of hexagonal plates; the jaws, bases of fins, and tail only free. OSTRACODERMI.
aa. Jaws each modified into a sort of beak; each jaw with an enamel-like covering and without distinct teeth; scales rhomboid or spiniform, with root-like insertions; spinous dorsal wanting. GYMNODONTES.

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* The definition of this group is taken from Dr. Gill. (Proc. U. S. Nat. Mus. 1884, 412.)

Suborder SCLERODERMI.

Plectognaths with a spinous dorsal composed of one or more spines inserted just behind the cranium; body of the normal fish-like shape; scales rough, or spinigerous, of regular form; jaws with distinct teeth, conical or incisor-like. Four families may be recognized. (*σκληρός*, hard; *δέρμα*, skin.)

a. Ventral fins represented each by a large spine, normally articulating with the pelvic bones; scales rounded, more or less spinigerous; vertebræ 19. TRIACANTHIDÆ, CLXVIII.

aa. Ventral fins obsolete or the pair represented by a single spine at the end of the long pelvic bone; scales rough, rhombic, or spiniform.

- *b.** Vertebræ in small number, 17 to 21; no barbel at chin; gill opening not before the eyes.
  - *c.* First dorsal composed of 3, rarely 2 spines, the first spine very large, the second locking it in erection; scales comparatively large, bony, rough, forming a coat of mail; vertebræ 17. BALISTIDÆ, CLXIX.
  - *cc.* First dorsal of a single spine, with a rudiment at its base; scales minute, not bony, the edges spinescent, so that the surface of the body is rough velvety. MONACANTHIDÆ, CLXX.

Family CLXVIII. TRIACANTHIDÆ.

Body compressed, covered with small or minute rounded scales more or less spinigerous. Mouth small; teeth in 1 or 2 series in each jaw, conical or incisor-like. First dorsal fin of 3 to 6 strong spines, the first one largest; soft dorsal rather long and low, similar to anal; ventral fins each a strong spine attached to the pelvic bone; vertebræ (in *Triacanthus*) 9 + 10 = 19. Three genera and about 5 species; tropical shore fishes, chiefly East Indian, 1 of them American. (*Triacanthina*, Günther, Cat. Fishes, VIII, 208–211, 1870.)

TRIACANTHODINÆ:

a. Teeth conical, not incisor-like; caudal peduncle short.

- *b.* Teeth in one row in each jaw. HOLLARDIA, 666.

666. HOLLARDIA, Poey.

Hollardia, POEY, Memorias, II, 348, 1861 (*hollardi*).

Body compressed, rhomboid; the back elevated mesially, the dorsal and ventral outlines similar. Dorsal inserted posteriorly, with 6 spines, not depressible in a furrow, the first spine much larger and longer than the others; ventral spines long and rough; teeth conical, in 1 series, about 10 in each jaw; no distinct lateral line; scales each of several simple spines separate to the base, long and sharp. One species. (Named for Henri Hollard,† at one time professor of zoology in the faculty of sciences at Poiters,

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* Vertebræ 29 or 30, chin with a long barbel, gill openings before the eyes, in the East Indian family, *Psilocephalidæ*.

† "Je prie M. Hollard d'accepter mon hommage, comme un tribut de reconnaissance pour le beau travail qu'il a inséré dans les Annales des Sciences Naturelles." (Poey.)

Holland, author of "Monographie de la famille des Balistoides" (1853) and other papers, the chief source of our knowledge of the structure and relations of the Plectognaths.)

2113. HOLLARDIA HOLLARDI, Poey.

Head 2⅔; depth 1⅘; eye large, 2½ in head. D. VI, 17; A. 14; P. 15; C. 12. Upper and lower profiles of head equally oblique; first dorsal spine at middle of body and at its highest point; teeth slender, 5 + 5 in each jaw; fin rays all rough; ventral spines longer than longest dorsal spine, 1⅓ in head; soft vertical fins rounded; pectoral short, pointed; gill opening vertical; skin everywhere very rough. Pale greenish, with interrupted dark bands. Cuba; a single injured specimen, 9½ inches long, washed ashore on the reef near Havana.

Hollardia hollardi, POEY, Memorias, II, 348, pl. 18, fig. 11, 1861, Cuba; GÜNTHER, Cat., VIII, 209, 1870.

Family CLXIX. BALISTIDÆ.

(THE TRIGGER-FISHES.)

Body oblong, or ovate, moderately compressed, covered with rather large rough scales or scutes of varying form, the scutes not forming an immovable carapace. Lateral line obscure or wanting. Mouth small, terminal, low; jaws short, each with about 1 series of separate incisor-like teeth; eye near occiput; preorbital very deep. Chin without barbel. Gill openings small, slit-like, above or in front of pectoral fins, and not before eyes. Dorsal fins 2, the anterior of 2 or 3 spines, the first spine highest, very strong, the second locking it in erection; second dorsal remote from the first, of many soft rays; caudal fin rounded or forked; ventral fins wanting, their place occupied by a single stout thick spine at the end of the very long, usually movable, pubic bone. Post-temporal short, simple, the forks obliterated, the bone grown solidly to the skull, and with no foramen. Vertebræ in reduced number (17). Genera about 9, species about 50. Shore fishes of the tropical seas, of rather large size, carnivorous or partly herbivorous, very rarely used as food, many of them reputed as poisonous. According to Dr. Day, "Eating the flesh of these fishes occasions in places symptoms of most virulent poisoning. Dr. Mennier, at the Mauritius, considers that the poisonous flesh acts primarily on the nervous tissue of the stomach, occasioning violent spasms of that organ and shortly afterwards of all the muscles of the body. The frame becomes racked with spasms, the tongue thickened, the eye fixed, the breathing laborious, and the patient expires in a paroxysm of extreme suffering." (*Balistidæ*, genus *Balistes*, Günther, Cat., VII, 211–229, 1870.)

- *a.* Caudal peduncle compressed.
  - *b.* Teeth white or pale, not red.
    - *c.* Teeth unequal, oblique, each one deeply notched.
      - *d.* Gill opening with a number of enlarged bony plates or scutes behind it; ventral flap movable, supported by a series of spines, more or less free at tip, and resembling fin rays; cheeks entirely scaled, without naked grooves or patches; eye with a groove before it; scales rather small, 50 to 75.

e. Dorsal and anal fins falcate in the adult; caudal lobes acuminate in adult; lateral line slender, undulate, more or less developed; scales of tail and posterior parts unarmed, similar to those on rest of body; ventral flap with slender, sharp spines; third dorsal spine little smaller than second and remote from it. BALISTES, 667.

ee. Dorsal and anal fins low and rounded, their angles and those of caudal not produced; lateral line obsolete, or with a trace at the shoulder; scales of posterior parts each with a blunt spine or tubercle; ventral flap narrow, its supporting spines stout and thick in the adult; third dorsal spine small. PACHYNATHUS, 668.

dd. Gill opening with only ordinary scales behind it; no enlarged plates or scutes; ventral flap scarcely movable, its surface scaled; lateral line obsolete; third dorsal spine small or wanting; vertical fins in adult more or less angulate or falcate.

f. Chin not projecting; cheeks closely scaled; dorsal spines 3; scales of posterior parts unarmed or keeled. CANTHIDERMIS, 669.

ff. Chin much projecting; cheek with 3 to 5 narrow parallel grooves; dorsal spines 2; scales of posterior parts more or less keeled. XANTHICHTHYS, 670.

cc. Teeth even, incisor-like; scales of posterior parts more or less keeled; a groove before eye, enlarged scutes behind it; lateral line obsolete; third dorsal spine small or wanting; cheeks entirely scaled, but marked by narrow grooves; enlarged scales present behind gill opening; ventral flap scarcely movable, its surface scaled; vertical fins more or less angulated. MELICHTHYS, 671.

667. BALISTES (Artedi) Linnæus.

(TRIGGER-FISHES.)

Balistes (ARTEDI) LINNÆUS, Syst. Nat., Ed. X, 327, 1758 (*vetula*).
Capriscus, RAFINESQUE, Indice, 41, 1810 (*capriscus*).
Chalisoma, SWAINSON, Nat. Hist. Class'n Fishes, II, 325, 1839 (*pulcherrima*).
Capriscus, SWAINSON, Nat. Hist. Class'n Fishes, II, 326, 1839 (*capriscus*, after *Capriscus* of WILLUGHBY).

Body compressed, covered with thick, rough scales or plates of moderate size, 50 to 75 in a lengthwise series; a naked groove before eye below nostrils; lateral line more or less developed, very slender, undulate, conspicuous only when the scales are dry, extending on the cheeks. Pelvic flap large, movable, supported by a series of slender, pungent spines. Caudal peduncle compressed, its scales unarmed, without spines or differentiated tubercles similar to those on rest of body. Gill opening with enlarged bony scutes behind it; cheeks entirely scaly, without naked patches or grooves. Both jaws with irregular, incisor-like teeth, usually 4 on each side in each jaw. First dorsal of 3 spines, the anterior of which is much the largest, the second acting as a trigger, locking the first when erected; the third nearly as large as second and remote from it; second dorsal and anal long, similar to each other, in the adult always falcate or filamentous in front; caudal fin rounded, with the outer rays much produced in the adult; branchiostegals 6; vertebræ 7 + 10. Species rather few, chiefly American; some of them straying to the Old World. (*βάλλω*, to shoot; *balista,* an instrument for throwing arrows, in allusion to the trigger-like spine; the word is taken directly from the Italian name *Pesce Balistra,* cross-bow fish.)

CAPRISCUS:

a. Lateral[*] line complete, beginning on the lower part of cheek, thence extending upward to behind eye, thence backward to beyond first dorsal, thence abruptly downward to above anal, then upward and at last horizontally backward on caudal peduncle, the line everywhere much undulated, the lines of the two sides connected by a cross line at the nape; dorsal fin falcate or filamentous; dorsal rays about III, 27; A. 25.
  b. Scales quite small, about 70 to 75 in a lengthwise series; dorsal and anal unmarked or nearly so. POLYLEPIS, 2114.
  bb. Scales moderate, in about 60 (50 to 65) in a lengthwise series.
    c. Body with few blue spots or none.
      d. Dorsal and anal fins plain dusky olive; scales 50. NAUFRAGIUM, 2115.
      dd. Dorsal and anal with oblique dark bands of bluish spots; young clouded, and with vague, dusky blotches at base of dorsal; scales about 60. CAROLINENSIS, 2116.
    cc. Body covered with roundish blue-black spots; dorsal and anal similarly spotted. FORCIPATUS, 2117.

BALISTES:

aa. Lateral line incomplete, usually developed only on head, nape, and caudal peduncle; cheek with 2 broad curved blue bands; smaller bands radiating from eye; dorsal in adult with the anterior rays filamentous. D. III, 28 or 29; A. 25 to 27; scales 60 to 63; dorsal and anal with oblique bluish bands; 37 scales between origin of dorsal and vent. VETULA, 2118.

Subgenus CAPRISCUS, Rafinesque.

2114. BALISTES POLYLEPIS, Steindachner.

(PEZ PUERCO.)

Head 3⅓ to 3½; depth 1¾; snout 1⅓ in head; eye 5 in head. D. III, 27; A. 25 or 26; scales 70 to 75. Caudal peduncle unarmed. Upper profile moderately elevated. Eight teeth in each jaw; a group of large plates behind gill opening; a groove below the nostril. Dorsal and anal much elevated in front, the longest rays about as long as head in the adult; caudal concave, with its angles much produced; pectoral short; lateral line exactly as in *Balistes carolinensis.* Color brown, a half ring at the corner of the mouth; diffuse blue spots on nape and about spinous dorsal; vertical fins nearly plain olivaceous. Lower California to Panama, generally common; a large species, reaching a length of 2 feet. (πολύς, many; λεπίς, scale.)

Balistes polylepis, STEINDACHNER, Ichth. Beitr., v, 21, 1876, Magdalena Bay; Mazatlan; Acapulco.

2115. BALISTES NAUFRAGIUM, Jordan & Starks.

(PEZ PUERCO DE LAS PIEDRAS.)

Head 3; depth 1⅘. D. III, 27; A. 24; scales 50, 12 rows on cheek; snout 1¼ in head; eye 5; first dorsal spine 1⅗; longest ray 1⅕; longest anal ray 1⅔; upper caudal lobe 1⅓; pectoral 2¼. Body very plump, not strongly compressed; no spinules on caudal peduncle; a few larger scutes behind gill openings; groove before eye slight, not naked. Lateral line traceable for most of its length. First dorsal spine very stout, the third remote, moderate; dorsal moderately elevated and falcate; anal rounded; caudal double concave, the pointed outer rays longer than the rounded inner ones. Dark dull olive green, nearly plain, edges of scales largely pale blue, especially toward the tail; faint traces of numerous dark cross bands; no streaks on cheeks; fins dusky olive, the pectoral and first dorsal paler, base of pectoral dusky. Several specimens, each about a foot long, were taken from the wreck of a French man-of-war in the Astillero at Mazatlan by using dynamite. Found in company with *Pomacanthus zonipectus* and *Xesurus punctatus*. (*naufragium*, a shipwreck.)

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[*] The lateral line in these fishes is usually not noticeable unless the scales are dry.

Balistes naufragium, JORDAN & STARKS, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 488, Mazatlan. (Type, No. 1656, L. S. Jr. Univ. Mus. Coll. Hopkins Expedition to Sinaloa.)

2116. BALISTES CAROLINENSIS, Gmelin.

(LEATHER JACKET; CUCUYO; "TURBOT.")

Head 3¼; depth 1¾. D. III, 27; A. 25; scales usually about 60 (55 to 63); about 35 scales in an oblique series from vent upward and forward. Third dorsal spine shorter but stouter than the second and remote from it; plates on head similar to those on body; caudal lobes produced in adult; soft dorsal high, its longest rays elevated but not filamentous, in adult 1¼ in head. Ventral flap large, supported by several slender pungent spines, resembling fin spines. Lateral line very slender, showing only as the scales begin to dry, its course everywhere undulating and very crooked; it extends from eye backward to interspace between dorsals, then bends abruptly and obliquely downward to opposite first third of anal, then forms a V-shaped figure, returning back to level of middle of caudal peduncle, whence nearly straight to base of caudal; a branch from behind eye extends obliquely downward and forward to the breast below pectorals; a cross branch at the nape connects the lateral lines of the two sides. Color in life, olive gray; a more or less distinct darker cross bar under front of second dorsal and 1 under last ray; some small violet spots on upper part of back; usually a ring of blue spots, alternating with olive-green streaks, about eye; violaceous marks on sides of snout; first dorsal spotted and clouded with bluish; second dorsal pale yellowish with clear sky-blue spots separated by olive-green reticulations, the spots arranged in rows; blue markings all fading in alcohol, leaving the olivaceous streaks; base of dorsal with 3 or 4 dark diffuse shades in the young; base of pectoral bluish, with olive spots; anal colored like soft dorsal; pectoral greenish. Tropical parts of the Atlantic; occasional northward in the Gulf Stream; very common on our coast and in the Mediterranean, rarely north to England. (Eu.)

Balistes carolinensis, GMELIN, Syst. Nat., I, 1468, 1788, Carolina.

Balistes capriscus, GMELIN, Syst. Nat., I, 1471, 1788, Indian and American Oceans, after GRONOW; GÜNTHER, Cat., VIII, 217, 1870; JORDAN & GILBERT, Synopsis, 855, 1883.

Balistes buniva, LACÉPÈDE, Hist. Nat. Poiss., I, 1798, Nice; on a specimen received from Professor Buniva.

Balistes caprinus, VALENCIENNES, Ichth. Iles Canaries, 94, pl. 16, 1836, Canaries.
Balistes fuliginosus, DE KAY, N. Y. Fauna: Fishes, 339, pl. 57, fig. 188, 1842, New York.
Balistes tœniopterus, POEY, Memorias, II, 326, 1861, Havana; adult.

2117. BALISTES FORCIPATUS, Gmelin.

Head 3; depth $2\frac{1}{5}$ in adult. D. III, 26 to 28; A. 25 to 27; scales 60; eye $4\frac{4}{5}$ in head; snout $3\frac{1}{2}$. General form of *Balistes capriscus*. First dorsal spine stout, rough anteriorly; third spine small, inserted well behind second; soft dorsal with the third, fourth, and fifth rays much elevated, considerably longer than head, in males at least; anal rounded, its anterior rays not elevated; caudal double concave, its upper rays produced in a short acute lobe. Four scapular plates—2 large, 2 small. Golden brown above, yellowish below; sides of head with many greenish-blue spots, oblong in form; a streak of similar color across snout; sides of body with blue-black spots larger than those on head; larger on lower parts but most distinct on back; most of these with a pale ring or ocellus; soft dorsal with similar spots, smaller and more ocellate; anal with smaller spots closer together; caudal unspotted; base of pectoral blotched with black. Lateral line evident. (Steindachner.) West coast of Africa and the neighboring islands, apparently straying to America, if *Balistes moribundus* and *Balistes powelli* are the same, as seems probable. (*forcipatus*, having forceps, from the form of the tail.)

Stipvisch, WILLUGHBY, Hist. Pisc., Appendix, 7, pl. 9, f. 4, 1686, High Seas, near St. Vincent.
Guaperva lata forcipata, LISTER, in Willughby, Hist. Pisc., Appendix, 21, pl. 1, 22, 1686, Brazil.
Balistes forcipatus, GMELIN, Syst. Nat., I, 1472, 1788, Brazil; after *Guaperva lata* of LISTER; GÜNTHER, Cat., VIII, 216, 1870.
Balistes punctatus, GMELIN, Syst. Nat., I, 1472, 1788; after *Stipvisch* of WILLUGHBY.
Balistes spilotopterygius, WALBAUM, Artedi Piscium, III, 455, 1792, Brazil; after *Guaperva lata*, LISTER.
Balistes guttatus, WALBAUM, Artedi Pisc., III, 467, 1792, St. Vincent; after *Stipvisch* of WILLUGHBY.
Balistes ciliaris, BLOCH & SCHNEIDER, Syst. Ichth., 471, 1801, Brazil; after LISTER.
Balistes liberiensis, STEINDACHNER, Ichth. Notizen, IV, 9, 1867, Monrovia in Liberia.
? *Balistes powelli*,* COPE, Proc. Ac. Nat. Sci. Phila. 1870, 120, Newport, R. I. (young); JORDAN & GILBERT, Synopsis, 855, 1883.
Balistes moribundus,† COPE, Trans. Amer. Phil. Soc. 1871, 479, St. Martins; young.

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* *Balistes powelli*, COPE. Head $3\frac{1}{2}$ in total length; depth $1\frac{3}{4}$. D. III, 26; A. 22. Form elevated, profile convex; scales without prominent spines; 2 or 3 scapular plates; first dorsal spine rugose, $1\frac{1}{4}$ in muzzle; third dorsal spine well developed. Ashy above, pale below; sides everywhere with series of longitudinally oval azure spots; dorsal and anal fins marked with smaller blue spots. (Cope.) Newport, Rhode Island; a doubtful species, probably the young of *Balistes forcipatus*; in any event a species straying from the West Indies in the Gulf Stream. The shorter anal is the only evident character by which *powelli* could be distinguished from *forcipatus*. (Named for its discoverer, Samuel Powell, of Newport.)

† The following is a description of the type of *Balistes moribundus*, COPE: Head $2\frac{3}{4}$; depth $1\frac{3}{4}$ in very young; eye 2 in snout in young. D. 29; A. 26; scales about 60. None of the rays produced (in the young). Caudal regularly convex, probably concave with age; first dorsal spine bristly in front; third spine well developed, much behind second; pelvic bone elongate, spinous behind, its posterior part movable, its flap with ray-like spines; scapular plates about 4; anterior teeth acuminate; cheek scales numerous, rugose, no naked fissures; anterior profile of head nearly straight; scales rough, their outlines indistinct, each with 2 rows of spinules, several in an anterior curved row, and 2 in a posterior row; no spines on caudal peduncle; lateral line not evident in the type, probably appearing with age. Color brown, with many small, pale-blue spots all over sides of

Subgenus BALISTES.

2118. BALISTES VETULA, Linnæus.

(OLD WIFE; OLD WENCH; COCHINO.)

Head 3; depth 1⅘. D. III, 29; A. 27; scales 63. Lateral line placed as in *Balistes carolinensis*, but the median part, from base of first dorsal to front of caudal peduncle wanting in the adult, branch on cheek ceasing opposite gill opening; cross branch present; ventral flap well developed, with slender, sharp spines. Scales on head much smaller and more crowded than those on body; third dorsal spine rather shorter and weaker than second, remote from it; caudal fin widely forked, the lobes filamentous and about equal; dorsal in adult filamentous at tip; anal little elevated anteriorly. Two curved, strongly marked, bluish, dark-edged bands on the side of the head, the lower from the angle of the mouth toward the throat, the upper from above the snout to the root of the pectoral; the color persistent in alcohol; a black, light-edged line, similarly curved below the eye; several other similar lines radiating from the eye; caudal fin margined above and below with bluish, and with an intra-marginal bluish band; dorsal and anal fins with transverse bluish bands; young with some irregular oblique black lines following the rows of scales. Tropical parts of the Atlantic. This species, according to Day, occurs also on the coast of India, but the Indian form, called *Balistes vetula*, has a larger number of fin rays. Common in the West Indies; occasionally northward in the Gulf Stream as far as Woods Hole. (*vetula*, an old woman; a name commonly used for the species in the West Indies, and, like *vieja*, its Spanish cognate, also applied to certain Labroids.)

Guaperva, MARCGRAVE, Hist. Bras., 163, 1648, Brazil.
Turdus oculo radiato (the Old Wife) CATESBY, Hist. Carol, pl. 22, 1725, Bahamas.
Balistes vetula, LINNÆUS, Syst. Nat., Ed. X, 329, 1758, Ascension Island; after *Balistes vetula* of OSBECK, Iter Chinensis, 294, 1757; GÜNTHER, Cat., VIII, 215, 1870; JORDAN & GILBERT, Synopsis, 855, 1883.
Balistes bellus, WALBAUM, Artedi Piscium, III, 467, 1792, West Indies, after FROYER.
Chaliosma velata, SWAINSON, Class'n Fishes, II, 325, 1839, after *Vetula;* probably a misprint.
Balistes equestris, GRONOW, Cat. Fishes, Ed. Gray, 31, 1854, American Seas.

668. PACHYNATHUS, Swainson.

Pachynathus, SWAINSON, Class'n Fishes, II, 326, 1839 (*triangularis*=*capistratus*); not *Pachygnatha* nor *Pachygnathus*, both these names earlier used for genera of spiders.

This genus differs from *Balistes* in the rounded outlines of the vertical fins and in the presence of spines or tubercles on the scales of the posterior part of the body. Ventral flap small, somewhat movable, its support-

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head and body, most of them oblong, most distinct posteriorly, wanting on breast; other spots distinct on sides of snout; 3 large black blotches at base of second dorsal fin and 1 at base of first, the latter diffuse, vague dark bands descending from these; dorsal and anal with pale spots, none on caudal; base of pectoral dusky. St. Martins Island, in the West Indies; known from 1 very young example obtained by Dr. von Rijersma; the above description from this specimen which is probably the young of *Balistes forcipatus*, from which only the rounded fins distinguish it; this evidently a character of immaturity. We are indebted to the kindness of Dr. Edward J. Nolan for an opportunity to examine this and others of Professor Cope's types. (*moribundus*, causing death.)

ing spines short and very thick; lateral line reduced to a trace at the shoulder. From the more closely allied genus *Balistapus*, to which most of the East Indian Balistoids belong, *Pachynathus* differs chiefly in the presence of the preocular groove. Species rather few; all of the Pacific Ocean; 1 ranging to our coasts. (παχύς, thick; γνάθος, jaw, hence correctly written *Pachygnathus*, a name preoccupied.)

2119. PACHYNATHUS CAPISTRATUS (Shaw).

(PEZ PUERCO.)

Head $2\frac{2}{5}$; depth 2. D. III, 30 or 31; A. 27 or 28; scales 54 to 64. Body rather oblong, a groove before the eye. Each scale, for about 9 rows on the tail and posterior part of sides, with a small, smooth, inconspicuous tubercle; about 34 scales in several parallel horizontal streaks in front of pectoral, a transverse series from soft dorsal to vent; a few bony scutes behind the gill opening, 1 of these considerably enlarged. Lateral line obsolete, reduced to a slender groove on a few scales behind eye. Dorsal and anal fins rather low, with outlines rounded or slightly angular in front, the first rays not produced; caudal double truncate, the angles scarcely produced. First dorsal spine strong, somewhat roughened. Ventral flap small, somewhat movable, supported by a few short, thick spines. Uniform blackish brown; a yellowish ring from middle of upper lip around the lower jaw; a straight yellow stripe from this ring toward the pectoral, not reaching the gill opening; this sometimes absent or indistinct. Two types of coloration seen by us. Some specimens, probably females,* are dull olive with darker clouds; no yellow on posterior parts which are scarcely paler behind; fins all plain olive blackish; streak behind mouth light bluish, very faint, soon fading after death; lower lip blue, then golden, then a blue ring, then yellow, then bluish; upper lip livid, bluish above. Other specimens, which are probably males, are dark olive clouded with darker; posterior half of body deep yellow below median line; fins blackish; first dorsal bright olive yellow on membranes; green on caudal membranes, the rays black; anal reddish; streak behind mouth bright red in one, whitish in another; upper lip livid blue, then orange, then golden, then livid, blue, or purplish, then orange, then crimson, then dark. Still other specimens have whitish marks instead of red. Pacific Ocean; widely distributed through the East Indies and on the coast of China; also abundant on the Pacific coast of tropical America from Magdalena Bay to the Galapagos. The specimens here described from the Venados and Creston islands at Mazatlan, and from La Paz and Chatham Island. Our (male) specimens agree perfectly with Bleeker's figure drawn from East Indian examples. (*capistratus*, bridled.)

Le Baliste bridé, LACÉPÈDE, Hist. Nat. Poiss., I, 335, 1798; on a drawing by COMMERSON; without locality.

Balistes capistratus, SHAW, Gen'l Zoöl., V, 417, 1804; after LACÉPÈDE.

Balistes amboinensis, GRAY, Hardwicke, Illust. Indian Zoöl., 1834, Amboina.

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*The sexual organs in specimens taken at Mazatlan in January are too little developed to enable us to recognize the distinctions.

Balistes mitis, BENNETT, Proc. Comm. Zoöl. Soc., I, 1831, 169, East Indies; GÜNTHER, Cat., VIII, 218, 1870.

Pachynathus triangularis, SWAINSON, Class'n Fishes, II, 326 1839, Vizagapatam; after RUSSELL, pl. 20.

Balistes hippe, RICHARDSON, Voy. Sulphur, Fishes, 127, 1843, East Indies.

Balistes frenatus, RICHARDSON, *l. c.*, 129, 1843, East Indies; BLEEKER, Atlas Ind., pl. 323, 1862.

Balistes schmittii, BLEEKER, Verh. Bat. Gen., XXIV, 37, 1852, Sumatra.

669. CANTHIDERMIS, Swainson.

(SOBACOS.)

Canthidermis, SWAINSON, Nat. Hist. Class'n. Anim., II, 325, 1839 (*angulosus*=*maculatus*).

This genus differs from *Balistes* chiefly in having the gill opening surrounded by ordinary scales, there being no developed bony scutes behind it. Body much more elongate than in *Balistes;* dorsal spines 3; dorsal and anal elevated in front; caudal with its angles acute; scales moderate, not very rough; scales of caudal peduncle unarmed, or with a median spine; cheeks completely scaled; a naked groove before eye. Species not well known, inhabiting both Indies. Günther places all except *C. aureolus* in the synonymy of *Canthidermis maculatus*. The variation in squamation and in the number of fin rays shows that at least *C. sufflamen* and especially *C. sobaco* are distinct from *C. maculatus*. (*ἄκανθα*, spine; *δέρμα*, skin.)

a. Scales of trunk each with a median spine or keel; eye moderate, 4 in snout measured obliquely; tips of vertical fins moderately produced; D. III, 26; A. 24. SOBACO, 2120.
aa. Scales of trunk without median spines or keel.
  b. Dorsal rays III, 27; anal rays 25. Eye large, 3 in snout, measured obliquely; tips of vertical fins much produced; adult plain brownish, unspotted, but sometimes clouded with paler. SUFFLAMEN, 2121.
  bb. Dorsal rays III, 22 to 24; anal 19 to 21; scales not very rough; adult with more or less of blue or pale spots. MACULATUS, 2122.
  bbb. Dorsal rays III, 20; anal rays 17; lower parts spotted with white. WILLUGHBEII, 2123.

2120. CANTHIDERMIS SOBACO,* Poey.

(SOBACO.)

Head 4 (in total with caudal); depth 2. D. III, 26; A. 24. Body compressed; first dorsal spine 7⅔ in total length; highest dorsal ray 3½; anal ray 3¾; eye 5½ in head, 4 in snout; pectoral short, rounded; caudal mesially convex, the points produced and equal; first dorsal spine over base of pectoral; distance from tip of snout to tip of pelvis equal to greatest depth of body; dorsal and anal falcate; scales granulated, those on the pelvis and base of dorsal and anal longer than broad; those of caudal region keeled or spinescent. Dark brown; vertical fins dusky; sexes similar; air bladder large; no pyloric cæcum. Length 2 feet. West Indies, rarely north in the Gulf Stream to Woods Hole, Massachusetts, where 2 young individuals, agreeing essentially with Cope's description of *C. asperrimus,* were recently obtained by the U. S. Fish Commission. (*Sobaco,* the Spanish name at Havana.)

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* The following nominal species is probably the young of *Canthidermis sobaco*: *Canthidermis asperrimus*, COPE.

D. 26; A. 24. Orbit large, 2¼ in muzzle, 4 in head. Pelvic depth 1⅘, humeral 2⅕ times in total length; anal depth 2⅖ times in the same. The scales possess a convex vertical series of short acute spines, with a median large spine directed backward from middle of series. Its anterior margin is sharp, and its anterior base supported by a number of convergent ribs. Spines of dorsal scales have a branch scale at base in front. The cheek scales are very numerous and not larger than those of body. Dorsal spine strong, stout, with 4 rows of spinules, smooth behind; no larger caudal spines; caudal fin convex, without projecting angles; profile nearly straight, interrupted by the convex orbital margin. Color brown above, yellowish below; 4 longitudinal dark-brown stripes above middle of side, which break into spots posteriorly; 3 brown spots at base of dorsal fin; belly with broad irregular dark bands: on the caudal peduncle and pelvic region similar broad bands form a coarse reticulated pattern; fins brown-spotted. Type 3 inches in length. Locality uncertain, supposed to be from St. Martins, West Indies, or from Darien. (Cope.) It belongs to Division I. A. of the genus of Hollard; that is, the scapular squamation similar to that of the sides, and the third dorsal spine well developed; the cheek scales not separated by naked fissures. (*asperrimus*, most rough.)

Balistes sobaco, POEY, Memorias, II, 324, 1861, Havana.
Balistes asperrimus, COPE, Trans. Am. Phil. Soc. 1871, 478, supposed to be from St. Martins.

2121. CANTHIDERMIS SUFFLAMEN (Mitchill).

(SOBACO.)

D. III, 27; A. 25. Differs from *Canthidermis sobaco* in the larger eye, which is 3 in the oblique length of snout. Points of dorsal and anal longer, that of dorsal 3 in total length; produced tips of caudal longer, reaching beyond the convex middle of fin. Scales of trunk without median spine or keel. Body more elongate. Dorsal and pelvic spines smoother than in *C. sobaco;* scales generally less rough. Plain brownish; sexes similar. West Indies; our specimens from Havana. This species and the preceding are referred by Günther to the synonymy of *Canthidermis maculatus.* This reference seems to be incorrect. *Canthidermis maculatus* is covered with round white spots; its vertical fins are higher than in *C. sufflamen,* and the number of fin rays is much less. (*sufflamen,* an impediment; referring to the second dorsal spine, which prevents the depression of the first.)

Sobaco, PARRA, Dif. Piezas Hist. Nat. Cuba, 17, f. 10, 1787, Havana.
Balistes sufflamen, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 467, locality unknown; said by De Kay to be from the South Atlantic.
Balistes macrops, POEY, Memorias, II, 326, 1861, Havana.

2122. CANTHIDERMIS MACULATUS (Bloch).

(OCEAN TURBOT.)

Body elongate. D. III, 24 (II, according to Bloch, who overlooked the third spine; III, 22, according to Gronow); A. 21 (19). Dorsal and anal fins short and high; body and fins with round blue spots; eye small; scales without median keel. West Indies. (Bloch.) Not seen by us. The description of Bloch agrees apparently with the species called *Balistes melanopterus* by Cope, who describes a specimen from "Darien," but whether from the Colon or the Panama side of the isthmus is not stated; probably the former. If we can trust descriptions, this species (*maculatus* = *melanopterus*) is closely allied to the one here called *Canthidermis sufflamen,* differing in the shorter dorsal and anal and the spotted body.

Possibly Günther is right in referring *sufflamen*, *macrops*, *oculatus*, and *willughbeii* to the synonymy of *maculatus*, but in that case the variations in color and in fin rays must be unusually large. (*maculatus*, spotted.)

Balistes radio dorsale ventralique humilimo, etc., GRONOW, Zoophyl., 192, 1765, American Ocean; dorsal rays III, 22; A. 19; belly spotted with white.

Balistes maculatus, BLOCH, Ichthyologia, pl. 151, 1786, West Indies (based on a specimen with D. II, 24; A. 21; body and fins spotted with blue); GÜNTHER, Cat., VIII, 213, 1870; in part.

Balistes americanus, GMELIN, Syst. Nat., I, 1472, 1788, America; after GRONOW.

Balistes macropterus, WALBAUM, Artedi Pisc., III, 465, 1792, America; after GRONOW.

? Balistes oculatus,* GRAY, Hardwicke's Illust. Ind. Zoöl., Fishes, pl. 8, fig. 1, 1832, India (young); figured by BLEEKER, with white spots. D. III, 24; A. 21.

Balistes rufus, GRONOW, Cat. Fishes, Ed. Gray, 36, 1854, American Ocean. D. III, 22; A. 19; after GRONOW.

Balistes longus, GRONOW, Cat. Fishes, Ed. Gray, 37, 1854, American Ocean. D. III, 24; A. 21; color reddish, paler below; eye moderate,

Balistes melanopterus,† COPE, Trans. Am. Phil. Soc. 1871, 478, Darien.

Balistes maculatus, DAY, Fishes of India, 688, 1878,* in part.

2123. CANTHIDERMIS WILLUGHBEII (Lay & Bennett).

Head 3⅓; depth 2⅓; eye moderate, about 4 in snout. D. III, 20; A. 17; scales about 63. Body elongate, covered with smoothish scales, those on caudal peduncle not keeled. Third dorsal spine small, not far behind second; ventral flap as in *Xanthichthys*, obscure, immovable, scaled over in adult. Jaws subequal. Dorsal and anal short and high, the longest dorsal ray 3½ in body, longer than base of fin. Caudal mesially rounded, with sharp angles. No lateral line. Greenish, with round bluish spots from size of pupil nearly to size of eye, on body and bases of vertical fins.

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* The following is Day's description of the East Indian species, *Canthidermis oculatus* (Gray), to which he gives the name *Canthidermis maculatus*. This description apparently refers especially to *Canthidermis oculatus*, but it includes Atlantic specimens, and may be confused with *Canthidermis sufflamen*:

"B. VI. D. III, 26 or 27; P. 15; A. 24 or 25; C. 12; scales 46 to 55; L. tr. 28; length of head 3⅔ to 4, of caudal fin 6½ to 7; height of body 2½ to 3 in total length; eye 2 to 2½ diameters from end of snout and 2 apart. A groove in front of eye. Teeth uneven, notched. First dorsal fin commences above gill opening, its anterior spine strong and nearly ½ as long as head; ventral spine usually movable; posterior edge of caudal convex or undulated; second dorsal and anal high anteriorly, especially in adults. Cheeks entirely scaled; no osseous scutes behind gill opening. Scales rough and granulated, but without spines or prominent tubercles, except in the immature. Bluish black; young examples are covered with numerous light blotches, more especially in lower half of body, these spots are less numerous and larger in adults; dorsal spine black; eyes hazel. Indian and Atlantic Oceans, more especially in their tropical and subtropical portions; also the Pacific, and occasionally on the British coast. It is very common at Madras, attaining at least 16 inches in length."

† The following is Cope's description of *Balistes melanopterus*:

Radii 2. D. 24; A. 21. Diameter of orbit twice in muzzle and teeth; front convex in profile, head rather acuminate; anal depth 2.66 times in same. Length of head (to branchial slit) 3.33 in same. Anterior rays much larger than posterior, but not produced beyond membrane. Extremity of caudal fin slightly rounded. First spinous dorsal ray as long as from orbit to rictus oris, rugose, the rugæ almost spinous distally, the points all directed forward, not outward, as in *B. asperrimus*. Third spine well developed. Scales with 3 rows of spines on posterior and 4 on anterior part of body. On the former 1 anterior is prominent and directed backward, some 10 rows being most marked; they disappear toward other parts of the body, and the smaller spines become tubercles. The whole surface of the scale is covered with these, and the radiating ridges which converge towards them. Scales on scapular region very small. Pelvic plate narrow, without joint, cheek scales in transverse series. Post-pelvic rays indistinct or wanting. Color blackish above, brown below, spotted except on head and anterior part of back with pale-brown spots smaller than pupil; unpaired fins uniform black. Darien. Length 4 inches.

Size large. East Indies; once doubtfully recorded from Acapulco. Very close to *Canthidermis maculatus*, if really different. It has still fewer fin rays if the figure of Bleeker and the description of Lay & Bennett can be trusted. (Named for Francis Willughby, the learned author of Historia Piscium, in 1686.)

Balistes willughbeii, Lay & Bennett,* Zoölogy of Beechey's Voyage, 68, pl. 21, fig. 2, 1839, Acapulco.

? *Balistes maculatus*, Bleeker, Atlas Ind., pl. 218, fig. 4, 1862, East Indies; not of Bloch.

670. XANTHICHTHYS, Kaup.

Xanthichthys† (Kaup) Richardson, Encyclopedia Britannica, Ed. xii, 313, 1856 (*curassavicus*).

Body oblong, covered with moderate-sized smoothish scales, those on posterior part of body usually with blunt keels; no enlarged scutes behind gill opening; no lateral line, or only a trace at the shoulder; a groove before eye; 3 to 5 narrow grooves on the cheek. Caudal peduncle deeper than broad; dorsal spines comparatively small, 2 only; soft dorsal and anal moderately elevated, the tips acute; caudal lunate; mouth small, placed high, the teeth as in *Balistes;* the lower jaw much projecting; ventral flaps undeveloped, immovable, and scaled over. Chiefly American; 2 species known; allied to *Canthidermis*, but differing in several regards, especially in the grooved cheeks, projecting chin, and fewer dorsal spines. (ξανθός, yellow; ἰχθύς, fish, which is not true of any species; possibly *Xanthium*, the cocklebur; ἰχθύς, fish, was intended.)

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* The following is the full text of the description of Lay & Bennett:

"*Bal. oblongo-ovalis*, infra confertim albido guttatus; squamis lateralibus posticisque subspinosis; pinnis dorsali sucunda analique elevatis, triangularibus; caudali triloba. D. 3, 20; P. 14; V. —; A. 17; C. 12, Plate xxi, fig. 2. *Guaperva longa, etc*, Will., Ichth. App., p. 21, tab. I", 20; Ray, Syn. Pisc., p. 48. Prickle or longest File-fish, Grew, Rav., p. 113, tab. 7. Hab. in Oceano Pacifico, prope Acapulco. A specimen of this fish was preserved by Captain Belcher, R. N., and presented by him to the Museum of the Zoological Society. Its form is more elongated than is usual among its congeners, its height being less than $\frac{1}{3}$ of its total length. Its surface, as in other species of *Balistes*, is divided into compartments, of which those behind the gill openings on each side are not evidently larger than the adjoining ones, their distinction in this part being very faintly marked; each of the compartments posterior to the pectoral fins, excepting those of the back and belly, is furnished, toward its anterior part, with a short whitish, somewhat spinous, tubercle, directed backwards. On the tail these tubercles form 9 rows, but none of them is sufficiently strong to deserve the name of spines, and they can only be regarded as representing the strong armature of this part in some other species. The total length is 11 inches, of which the caudal fin occupies 2 inches. From the tip of the nose to the anterior part of the orbit the distance is $1\frac{5}{8}$ inches; the diameter of the orbit, $\frac{3}{8}$ of an inch; the anterior ray of the first dorsal fin, 1 inch in length, is placed 1 inch behind the orbit; length of the first dorsal, 1 inch; between it and the second dorsal, $1\frac{1}{2}$ inches; length of second dorsal, 2 inches, that of its fourth ray being $2\frac{1}{4}$ inches; from its termination to the base of the caudal, $1\frac{3}{4}$ inches; length of the outer ray of the caudal, 2 inches, of the middle rays, $1\frac{3}{4}$; from the base of the caudal to the anal fin, $1\frac{3}{4}$ inches; base of the anal fin, $1\frac{3}{4}$ inches, its fourth ray being 2 inches in length; hence to the ventral, which is $\frac{1}{4}$ of an inch in length, $1\frac{3}{4}$ inches. The pectoral fins are moderate, 1 inch in length by $\frac{7}{8}$ in their greatest breadth. The greatest height is above the ventral fin; it is here $3\frac{1}{4}$ inches; the depth across the tail is 1 inch. The only distinct mention of this fish which we have met is contained in the works of Willughby, Rav, and Grew, whose several figures and descriptions rest all apparently on a single specimen, existing in their time in the Museum of the Royal Society. Of the identity of our species with theirs it is almost impossible to entertain a doubt. The synonyms quoted from them are referred by Bloch and succeeding writers to the *Balistes maculatus*, Bloch, a species differing in various respects, and particularly by its greater comparative breadth, its longer dorsal and anal fins, and the larger number of rays in those fins." (Lay & Bennett.)

† *Xanthichthys*, Kaup: Marked furrows on the face; 2 rays in the first dorsal; no shields behind the gill opening; 1 species, *X. curassavicus*. (Richardson, *l. c.*)

a. Cheek with 3 grooves; scaly basal part of dorsal and anal red; sides with distinct lines of purplish spots. RINGENS, 2124.

aa. Cheek with 5 narrow grooves; scaly basal part of dorsal and anal black; sides without distinct stripes or lines of dots; scales of posterior part of body obscurely tuberculate. MENTO, 2125.

2124. XANTHICHTHYS RINGENS (Linnæus).

(COCUYO.)

Head 3; depth 2. D. II, 31; A. 28; P. 14; scales 38. Body oblong, its depth at anus ⅙ less than at pelvis; eye very high, 5 in head, 3 in snout to tips of upper teeth; preocular furrow moderate; lower jaw much longer than upper; no enlarged plates behind gill opening; cheek with 3 oblique naked stripes like scars from gill opening to chin; dorsal spines 2, the first very large; soft dorsal moderately elevated, its longest ray ½ length of base of fin; anal similar, the margin little concave; caudal lunate, its angles well marked; ventral and dorsal spines not very rough; vertical diameter of scales double the longitudinal; median tubercle present only on the tail. Color clear violet, the stripes on cheeks violet black; body with interrupted longitudinal lines formed of a large violet point at each intersection of scales; fins of the ground color; upper and lower borders of caudal violet red, the posterior edge blood red; a narrow yellow streak along front of other fins; scaly sheath at base of fins red. West Indies and southward; recorded from Mauritius; probably widely distributed. Length 10 inches. (*ringens*, snarling or showing the teeth.)

Balistes ringens, LINNÆUS, Syst. Nat., Ed. X, 329, 1758, no locality; Mus. Adolph. Frid., 1, 58. D. III, 29; A. 26; "lateribus capites triplicates;" GÜNTHER, Cat., VIII, 221.

Cucuyo, PARRA, Dif. Piezas, etc., Cuba, 19, 1787, Havana; after LINNÆUS.

Balistes curassavicus, GMELIN, Syst. Nat., I, 1472, 1788, Curassavia (Curaçao); after GRONOW.

Balistes notatus, GRONOW, Cat. Fishes, Ed. Gray, 36, 1854, both Indies.

Balistes nitidus, GRONOW, Cat. Fishes, Ed. Gray, 36, 1854, American Ocean.

Balistes lineo-punctatus, HOLLARD, Ann. Sci. Nat. 1854, 4th Series, Vol. I, 65, Bourbon Island.

Balistes cicatricosus, POEY, Memorias, II, 327, 1861, Cuba.

Balistes heckeli,* J. W. VON MÜLLER, Reisen in Vereinigten Staaten, Canada und Mexico, I, 182, 1864, Mexico.

Xanthichthys cicatricosus, POEY, Synopsis, 435, 1868.

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* *Balistes heckeli*, von Müller, is apparently a species of *Xanthichthys*, and is probably identical with *X. ringens*. The original description is very imperfect and reads as follows:

"Der zweite Fisch gehört dem Genus *Balistes* an, dessen Charaktere in Folgendem bestehen: Acht Zähne in jeder Kinnlade, zwei Rückenflossen, von welchen die erste aus ein oder zwei hörnerartigen Stacheln besteht, die sie in eine Rinne auf dem Köpfe niederlegen können, die zweite aber weich ist und über der Afterflosse steht; die Bauchflossen fehlen und sind durch ein ähnliches Horn wie das auf dem Rücken ersetzt.

"Die gegenwärtige Species, welche ich ebenfalls mit Strängen von *Fucus pyriferus* auffischte, ist prachtvoll ultramarinblau auf dem Rücken, welches nach der Unterseite in Weiss übergeht; auf der Oberseite mit gelbrothen, nach dem Bauche blassziegelroth werden den Flecken; sämmtliche Flossen und Schwanz lebhaft ziegelroth; die wach vorn mit starken Sägezähnen versehenen Hörner dunkel graublau; das Auge feurig rostbraun, wird lebhaft und intelligent hin- und herbewegt. Brust- und Afterflossen befinden sich bei diesem Fisch in einer fortwährend auserordentlich raschen, zitterend Bewegung. Ich habe die Species meinen berühmten, zu früh dahin geschiedenen Freunde Heckel zu Ehren *Balistes heckelii* genannt."

(J. W. von Müller, Reisen in den Vereinigten Staaten, Canada und Mexico, I, 182, 183, 1864.)

2125. XANTHICHTHYS MENTO (Jordan & Gilbert).

Head 3½; depth 2⅖. D. II–I, 29; A. I, 26; scales 37, 23 in an oblique series upward and forward from front of anal. Body oblong, elliptical, slightly heaviest forward; dorsal and ventral outlines similar, neither much arched; body not strongly compressed, its greatest thickness a little less than ½ its greatest depth; mouth very small, terminal, higher up than usual, nearly in line of axis of body, the chin protruding beyond it; width of mouth from angle to angle about equal to diameter of eye. Lower jaw the longer, its teeth slightly directed backward; upper jaw with its teeth directed slightly forward, shutting outside of the lower teeth. Teeth pale brownish, somewhat unequal; lower teeth wedge-shaped, broadest and nearly truncate at tip; teeth of upper jaw obliquely truncate, slightly emarginate, the outer angle pointed and projecting; about 8 teeth in outer row; the mouth so closely shut that the inner row can not be seen; eye small, high, and well back, its diameter contained nearly twice in interorbital width, 3 in snout; a groove in front of eye below nostrils, about as long as diameter of eye; 5 narrow grooves on cheek below eye, extending from near mouth backward toward base of pectoral. Height of gill opening slightly greater than diameter of eye, its lower edge opposite middle of pectoral. Scales of body comparatively small, not very rough; scales of belly somewhat reduced in size, arranged in oblique series running downward and backward from pectoral region, these forming a contrast in direction with scales of sides; scales on caudal peduncle without keel or spines, similar to those on rest of body; scales on posterior portion of sides slightly carinate, forming low ridges along rows of scales. Gill opening surrounded by small scales and without larger plates. First dorsal spine very robust, placed somewhat behind eye, its height a little more than twice diameter of eye, the deep dorsal groove as long as spine; second spine short and slender, its length about equal to diameter of eye; third dorsal spine wholly wanting; soft dorsal rather high, its longest rays more than ½ length of base of fin, 1⅖ in head; anal similar, its base a little shorter, a few series of small scales covering base of each fin; caudal moderate, lunate, its depth from tip to tip more than its length, and 1¼ times in length of head. Caudal peduncle subterete, deeper than broad; ventral spine slightly movable; pectoral short, rounded, less than ½ length of head. Coloration in spirits, dark olive above, rather pale below, the skin between scales somewhat darker; scaly basal part of dorsal and anal abruptly black; membrane of these fins yellowish, the tips dusky; scaly base of caudal dark brown, the medial part lighter brownish; a lunate band at tip yellowish; pectorals olivaceous. Rocky Islands off the west coast of Mexico, not common; close to *Xanthichthys ringens*. Length 1 foot. (*mento*, having a long chin.)

Balistes mento, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 228, Clarion Island, Revillagigedo Group. (Type, No. 28387. Coll. Lieut. H. E. Nichols.)

671. MELICHTHYS, Swainson.

Melichthys, SWAINSON, Class. Anim., II, 325, 1839 (*ringens*, BLOCH; not of LINNÆUS).
Melanichthys, GÜNTHER, Cat., VIII, 227, 1870; corrected spelling.

This genus differs from *Balistes* chiefly in the presence of a series of even, white, incisor-like teeth, instead of the irregular incisors of *Balistes*. The tail is unarmed or the scales slightly keeled; a groove is present before the eye below the nostrils, and the cheeks are wholly scaled. The vertical fins are angulated, but not produced in filaments; ventral flap small, immovable, and covered with rough scales. Tropical seas. (μέλας, black; ἰχθύς, fish.)

a. Dorsal spines 3, soft rays 34; anal rays 32.	PICEUS, 2126.
aa. Dorsal spines 2, soft rays 32; anal rays 29.	BISPINOSUS, 2127.

2126. MELICHTHYS PICEUS (Poey).

(GALAFATE; BLACK OLDWIFE; CALAFATE.)

Head 4 in length to end of middle of rays of caudal. D. III, 34; A. 32; scales about 53; eye 4 in snout, as long as preocular furrow; dorsal spines 3; caudal truncate with its points produced for a distance $\frac{1}{5}$ length of fin. Blue black, a sky-blue band along bases of dorsal and anal; a white band along posterior edge of caudal parallel with the border. (Poey.) West Indies and southward; not very common; very likely identical with the East Indian species, which has been wrongly identified by authors as *Balistes buniva*, *ringens*, or *niger*. If the species are identical the name *piceus* should apparently be retained, as none of these earlier names was intended for this fish. (*piceus*, pitch-black.)

Balistes nigra, OSBECK, Iter Chinensis, 295, 1757, Ascension Island; pre-Linnæan; called *Balistes ringens* after LINNÆUS in later or post-Linnæan editions.
Galafate, PARRA, Dif. Piezas, etc., 18, 1787, Havana.
? *Melichthys ringens*, BLEEKER, Atlas. Ind. Ichth., V, 108, pl. 220, fig. 1, 1862, East Indies; not *Balistes ringens* LINNÆUS.
Balistes piceus, POEY, Proc. Ac. Nat. Sci. Phila. 1863, 180, Cuba.
? *Balistes buniva*, GÜNTHER, Cat., VIII, 228, 1870; not of LACÉPÈDE.
? *Balistes niger*, GÜNTHER, Fishes Zanzibar, 135, pl. 19, fig. 1, 1866, not of Mungo Park nor of Hollard.

2127. MELICHTHYS BISPINOSUS, Gilbert.

Head $3\frac{2}{3}$; depth 2. D. II, 32; A. 29; P. 15; scales 52. Lower jaw but little protruding in open mouth; 8 teeth in each jaw, the 2 anterior of which are broad truncate incisors without notch; 3 lateral teeth in lower jaw conspicuously notched, the anterior angle projecting; in the upper jaw the posterior tooth is truncate, entire, and the other 2 lateral teeth but slightly notched; teeth in lower jaw each with a strong horizontal backward process; eye 5 in snout; length of anteorbital groove $\frac{2}{3}$ eye; width of gill slit $\frac{1}{2}$ snout; distance from end of dorsal groove to soft dorsal $2\frac{1}{3}$ in snout; first dorsal spine very heavy, its tip curved backward, its length $\frac{1}{2}$ head, the front and sides of spine rugose, but not spinous, the rugosities coarser in front and above; second dorsal spine very slender,

$\frac{2}{5}$ height of first; no trace of a third spine, the membrane extending almost to posterior end of groove, the length of its base about $\frac{1}{2}$ snout; second dorsal and anal not falcate, the upper outline straight, the fins becoming uniformly lower posteriorly; caudal fin slightly convex behind, the tips produced for a distance about equal to diameter of orbit; plates very rough, with broken ridges radiating from base, essentially similar in shape on sides of body and head, showing no tendency to coalesce on cheeks; 8 raised lines formed of rough median crests on the plates on posterior part of sides, the crests not bearing distinct spines; several enlarged plates immediately behind the opercle, each with centrally radiating lines; pelvic spine very rough, as well as the membrane immediately behind it. Color, very deep cobalt blue in life, becoming uniformly black in spirits; a narrow light blue line along bases of dorsal and anal, becoming white in spirits; caudal with an intramarginal black band, edged posteriorly with a very narrow white line. Very abundant at Clarion and Socorro islands. (*bispinosus,* having 2 spines.)

Melichthys bispinosus, GILBERT, Proc. U. S. Nat. Mus. 1890, 125, Clarion and Socorro islands, of the Revillagigedo Archipelago. (Coll. *Albatross*.)

Family CLXX. MONACANTHIDÆ.

(THE FILE FISHES.)

Body much compressed, covered with very small rough scales, forming a velvety covering; males sometimes with spines on the caudal peduncle. Upper jaw with a double series of incisor-like teeth, 6 in the outer, and 4 in the inner series; lower jaw with 6 similar teeth in a single series; first dorsal with a single strong spine and generally a rudimentary one behind it; second dorsal long, similar to anal; ventral fins reduced to a simple osseous, fixed or movable, small appendage at the end of the long pelvic bone; this appendage often rudimentary or entirely absent; no barbel; vertebræ 7+11 to 14=18 to 21. Genera 6 or more; species about 50. Herbivorous shore fishes of warm seas, closely allied to the *Balistidæ,* differing chiefly in having the first dorsal represented by a single spine, behind which is sometimes a rudiment; scales small, spinigerous, the skin mostly rough velvety. The species are mostly small in size and are not used as food, having little flesh and that of a bitterish taste. (Genus *Monacanthus* Günther, Cat., VIII, 229-254, 1870).

- *a.* Pubic bone with a small spine at its end; gill opening short, nearly vertical; dorsal and anal moderate, each of less than 40 rays.
  - *b.* Pelvic spine movable.
    - *c.* Dorsal spine not barbed, its edge merely rough. CANTHERINES, 672.
    - *cc.* Dorsal spine armed with strong retrorse barbs, usually in 2 series. MONACANTHUS, 673.
  - *bb.* Pelvic spine fixed; dorsal spine with about 4 series of small barbs. PSEUDOMONACANTHUS, 674.
- *aa.* Pubic bone without spine at its end, gill opening long, oblique; dorsal and anal long, each of 40 or more rays; dorsal spine without barbs, inserted above the orbit. ALUTERA, 675.

672. CANTHERINES, Swainson.

Cantherines, SWAINSON, Class'n Fishes, II, 327, 1839 (*nasutus* = *sandwichensis*).
? *Acanthoderma*, AGASSIZ, Poiss. Fossiles, Vol. 2, 251, 1843 (*ovale;* fossil; name preoccupied).
Liomonacanthus, BLEEKER, Ned. Tydskr. Dierk., III, 11, 1866 (*pardalis*).
Canthorhinus, GILL; corrected spelling.

This genus differs from *Monacanthus* chiefly in the absence of barbs on the dorsal spine, which is long, strong, and placed over the front of the eye. Scales minute. Species few. (*κάνθος*, ass, or more likely *ἄκανθα*, spine; *ῥίν*, snout.)

a. Dorsal I, 35; A. 31. PULLUS, 2128.
aa. Dorsal I, 38; A. 34. CAROLÆ, 2129.

2128. CANTHERINES PULLUS (Ranzani).

(LIJA COLORADA.)

Depth about 2. D. II, 35; A. 31. Body moderately elevated; snout moderately produced, the upper profile slightly concave; posterior margin of eye directly above axil. Adults (12 inches long) with 2 to 6 pairs of strong recurved spines on each side of tail; caudal short; dorsal spine nearly straight, rather shorter than head, without barbs, serrulate in front, situated above front of eye; skin with a velvety appearance; the scales minute. Coloration variable, generally with a whitish spot behind the last dorsal ray, and several more or less distinct pale longitudinal bands along tail; head with undulated bluish streaks; body sometimes with scattered round light spots, each with a dark speck in the center; young sometimes uniform silvery; color probably varying with surroundings. Reaches a weight of 6 pounds. (Günther.) West Indies and coast of Brazil, occasionally north to southern Florida; specimens from Bahia examined by us, brown in color, without markings. Identified by Günther with the widely distributed East Indian species, *Cantherines pardalis*, perhaps correctly, but the color seems different. (*pullus*, dusky gray.)

Lija colorada, PARRA, Dif. Piezas, etc., pl. 23, 1787, Cuba.
Monacanthus pullus, RANZANI, Nov. Comm. Act. Sci. Inst. Bonon., v, 4, pl. 1, 1842, Brazil; JORDAN & GILBERT, Synopsis, 858, 1883.
Monacanthus macrocerus, HOLLARD, *l. c.*, II, 327, pl. 12, fig. 1, 1854; adult, Bahia; body covered with rounded spots, size of eye.
Monacanthus ruppelii, CASTELNAU, Anim. Am. Nouv. Amér. Sud, Poiss., 97, pl. 47, fig. 2, 1855, Bahia; D. II, 35; A. 30; body with orange spots.
Monacanthus irroratus, POEY, Memorias, II, 330, 1861, Cuba; cheeks with oblique orange streaks; body with longitudinal brown streaks and pale spots.
Monacanthus stratus, POEY, Memorias, II, 329, 1861, Cuba; 6 spines on each side of tail.
Monacanthus parraianus, POEY, Proc. Ac. Nat. Sci. Phila. 1863, 185, Cuba; after *Lija Colorada* of PARRA; 4 spines on each side of tail.
Monacanthus punctatus, POEY, Synopsis, 437, 1868, Cuba; no stripes on sides of cheek; spots on body yellow.
Monacanthus pardalis, GÜNTHER, Cat., VIII, 230, 1870; in part, probably not of RÜPPELL.

2129. CANTHERINES CAROLÆ, Jordan & McGregor, new species.

Head $3\frac{1}{10}$; depth 2. D. I, 38; A. 34; eye $5\frac{1}{2}$. Body elliptical, compressed; anterior profile somewhat concave, oblique; mouth small; teeth large, white, and irregular; gill opening somewhat in front of pectoral, its length 3⅓ in head; dorsal spine very stout and straight, everywhere rough, but without distinct barbs, 1½ in head; dorsal rays 2 in head; anal ray 2 in head; caudal short and rounded, 1⅔ in head; pectoral 2⅓ in head; pelvic bone with ventral spine firmly attached, the latter with about 10 radiating spinules; ventral flap little developed; caudal peduncle with 4 strong, bluntish spines, turned forward and arrayed in 2 pairs, 1 above and 1 below the middle line. Color dull grayish olive; head finely speckled with darker; fins all pale; lips whitish. Islands off the west coast of Mexico; 1 specimen about 7 inches long from Clarion Island. (Named for Mrs. Charlotte McGregor, mother of Richard C. McGregor.)

Cantherines carolæ, JORDAN & MCGREGOR MS., Clarion Island. (Type, No. 11995, L. S. Jr. Univ. Mus. Coll. R. C. McGregor.)

673. MONACANTHUS, Cuvier.

Monacanthus, CUVIER, Règne Animal, Ed. I, 152, 1817 (*chinensis*).
Trichoderma, SWAINSON, Class'n Fishes, etc., II, 327, 1839 (*scapus*=*Balisteherissé*, Lacépède).
Stephanolepis, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 78 (*setifer*).

Body short and deep, very strongly compressed, covered with minute, rough scales. Mouth very small; upper jaw with a double series of incisor-like teeth, usually 6 in the outer and 4 in the inner series; lower jaw with about 6 incisors in a single series; teeth connivent, unequal; gill opening a small slit, shorter than the eye, nearly vertical below the posterior part of the eye, and just in front of upper edge of pectoral. Dorsal spine large, armed with 2 series of retrorse barbs, and no conspicuous filaments; second dorsal and anal fins similar to each other, of about 25 to 35 rays each; caudal fin moderate, rounded; pelvic bone with a blunt, movable spine, the bone connected by a movable flap of varying size; side of tail often with a patch of spines, especially in the males. Vertebræ 7 + 11 to 14 = 18 to 21. Species very numerous, in warm seas, most of them reaching a small size. All are lean fishes with leathery skin and bitter flesh, unsuited for food. (*μόνος*, one; *ἄκανθα*, spine.)

MONACANTHUS:
  a. Ventral flap in the adult greatly developed, extending much beyond the ventral spine; adult with 2 or 3 pairs of recurved spines on caudal peduncle; young without these characters, similar to young of *Stephanolepis*.
    b. D. I, 30; A. 30. Color very variable. CILIATUS, 2130.
STEPHANOLEPIS (*στέφανος*, crown; *λεπίς*, scale):
  aa. Ventral flap, even in adult, moderately developed, not reaching beyond pelvic spine; no recurved spines on caudal peduncle.
    c. Dorsal and anal each with 30 to 32 soft rays.
      d. Depth more than ½ length of body. HISPIDUS, 2131.
      dd. Depth less than ½ length of body. SPILONOTUS, 2132.
    cc. Dorsal and anal each with about 27 soft rays. OPPOSITUS, 2133.

2130. MONOCANTHUS CILIATUS (Mitchill).

(LEATHER FISH; LIJA.)

Head 3½; depth 1¾; young 1½. D. I, 30; A. 30; scales very small, without median crest. Spines becoming longer on caudal peduncle, which has in addition 2 or 3 pairs of strong spines curved forward, these prominent only in adults; ventral flap longer than head, about ⅓ length of body. Scales on ventral flap developed as flat plates, with their free margins pectinate. Snout pointed, the upper profile concave. Dorsal spine strong, nearly as long as head, armed behind with 2 rows of retrorse barbs; ventral spine small, rough. Color varying very much with the surroundings of the fish, from dull olive gray to the most vivid grass green; the markings not well defined and not very constant; green, with white cirri on sides; a whitish longitudinal cloud behind pectorals; a pale band downward and forward from eye; lower side of head with darker cross bands; dorsal and anal pinkish, with (usually 3) darker spots at base; ventral flap edged with scarlet; caudal greenish, mottled with darker and pale; some specimens show neither red nor green shades, and have vague, dusky, longitudinal stripes. West Indies and Florida; very abundant about the Florida Keys, with *M. hispidus*. The young of the 2 very much alike, but *ciliatus* is always more elongate, and as it grows older the pelvic flap grows much larger and the armature of the tail more distinct. Length 4 to 8 inches. (*ciliatus*, fringed with lashes.)

Balistes ciliatus, MITCHILL, Amer. Monthly Mag. and Crit. Rev., March, 1818, 326, Bahama Straits.

Monacanthus piraaca, KNER, Novara Fische, 396, 1867, Rio Janeiro.

Monacanthus occidentalis, GÜNTHER, Cat., VIII, 237, 1870, Puerto Cabello; JORDAN & GILBERT, Synopsis, 856, 1883.

Monacanthus davidsoni,* COPE, Trans. Amer. Phil. Soc. Phila., XIV, 1870, 476, Florida Reef; JORDAN & GILBERT, Synopsis, 857, 1883.

Monacanthus ciliatus, JORDAN, Proc. U. S. Nat. Mus. 1884, 145.

2131. MONACANTHUS HISPIDUS (Linnæus).

(FOOL FISH; FILE FISH; LEATHER FISH; HORNY CONY; LIJA.)

Head 3⅖; depth 1¾. D. I, 32; A. 32. Young slightly deeper (1½) proportionally than adult. Body rather deep. Jaws subequal; eyes large, about 3 in snout. Gill opening about as long as eye, separated from the eye by an interspace nearly equal to its length. Anterior profile slightly concave. Dorsal spine somewhat shorter than snout, more than ½ head, inserted above posterior part of eye, stout, rough, armed behind with 2 rows of retrorse barbs; first ray of soft dorsal often filamentous in the adult (male?), its length varying from that of snout to that of depth of body (longest among specimens seen by us is 1 from the Canary Islands); pectorals small. Pelvic bone long, ending in a short, blunt, movable spine, beyond which the abdominal flap does not extend. Scales minute, each with a crest of about 3 prickles, those on caudal peduncle villous, those on ventral flap larger, elongate; no naked areas; no recurved spines on tail. Grass green or olive; back and sides with faint, irregular whitish spots; head plain; spinous dorsal and caudal green; second dorsal and anal translucent; adult less variegated; dull olivaceous, mottled with dusky. Length 10 inches. Cape Cod to Cuba, abundant on our South Atlantic coast and the Florida Keys; also found southward, through the West Indies to Brazil, a large specimen from Bahia having been examined by us. It occurs also in the Canaries and Madeira. This species has been identified by Günther with the East Indian species, *Monacanthus setifer*, Bennett (1830), but that species seems to have the dorsal spine weaker, rather less than ½ head. (*hispidus*, bristly.)

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* Depth 2⅓. D. I, 30; A. 28. Scales with 3 scutes on a common base; long, slender, recurved spines on tail, in 2 or 3 clusters each; sides with slender scattered filaments. Dorsal spine with strong teeth, its height ½ depth of body; pelvic plate elongate, spinous all around. Brown, with 5 longitudinal bands with pale centers, the upper and lower forming 3 dark blotches at base of dorsal and anal; head unspotted; caudal with a brown cross band. Florida Reef. (Cope.)

Balistes hispidus, Linnæus, Syst. Nat., Ed. xii, 405, 1766, Carolina; Jordan, Proc. U. S. Nat. Mus. 1884, 145.
Balistes broccus, Mitchill, Trans. Lit. and Phil. Soc., i, 1815, 467 New York.
Monacanthus filamentosus, Valenciennes, Îles Canaries, 95, 1836, Canaries; adult.
Monacanthus gallinula, Valenciennes, Îles Canaries, 95, 1836, Canaries; young.
Monacanthus varius, Ranzani, Nov. Comm. Bonon., v, 6, 1842, Brazil.
Monacanthus massachusettensis, De Kay, N. Y. Fauna: Fishes, 337, pl. 57, fig. 187, 1842, Massachusetts Bay; Storer, Fishes Mass., 174, 1846.
Monacanthus setifer, De Kay, N. Y. Fauna: Fishes, 337, pl. 59, fig. 194, 1842, New York Harbor; probably not of Bennett; Günther, Cat., viii, 240, 1870, in part.
Monacanthus signifer, Storer, Synopsis Fishes N. A., 497, 1846, Massachusetts; substitute for *setifer*, preoccupied.
Monacanthus auriga, Lowe, Proc. Zool. Soc. Lond. 1850, 253, Madeira.
Stephanolepis setifer, Gill, Cat. Fishes East Coast N. A., 78, 1861.
Monacanthus broccus, Jordan & Gilbert, Synopsis, 856, 1883.

2132. MONACANTHUS SPILONOTUS, Cope.

Depth 2½. D. I, 32; A. 31; scales each supporting a pedicle, whose summit divides into 4 or 5 radiating spines. Body elongate, outline of front straight; dorsal spine long, with simple teeth, 4½ in length of body; dorsal and anal fins medially elevated; no brush or spines on caudal peduncle. Pelvic shield elongate, spinous all around, the movable portion present. Light brown; some longitudinal lines just below the dorsal fin, the median developing a dark spot below middle of soft dorsal. Gulf of Mexico. (Cope.) Not seen by us. Perhaps the young of *M. hispidus*, but more elongate than any specimens seen by us. (*σπίλος*, spot; *νῶτος*, back.)

Monacanthus spilonotus, Cope, Trans. Amer. Phil. Soc. Phila., xiv, 1870, 476, Gulf of Mexico (Coll. Capt. Baker); Jordan & Gilbert, Synopsis, 857, 1883.

2133. MONACANTHUS OPPOSITUS, Poey.

Depth about ½ of total length. D. I, 27; A. 27; P. 12. Preanal flap not extending beyond pelvic spine; profile of head not concave; dorsal spine over posterior part of eye; spine smoothish in front, with 2 rows of barbs behind. Ventral spine not "etalee;" anal inserted a little before second dorsal; dorsal and anal highest mesially. Scales on tail with brush-like spines. Color yellowish brown, with dark points forming irregular, interrupted longitudinal streaks on sides. Length about 6 inches. Cuba. (Poey.) Not seen by us. Apparently similar to *Monacanthus hispidus*, but the fins shorter. (*oppositus*, opposite, from the position of the dorsal and anal.)

Monacanthus oppositus, Poey, Memorias, ii, 331, 1861, Havana.

674. PSEUDOMONACANTHUS, Bleeker.

Pseudomonacanthus, BLEEKER, Nedrl. Tydskr. Dierk., III, 1866, 11 (*macrurus*).

This genus differs from *Monacanthus* chiefly in having the ventral spine immovably attached to the pelvic bone. The dorsal spine has usually about 4 rows of small barbs, the anterior edge as well as the posterior being armed. Species chiefly East Indian. (ψευδής, false; *Monacanthus*.)

2134. PSEUDOMONACANTHUS AMPHIOXYS (Cope).

Head 2⅔; depth 2. D. I, 35; A. 30. Eye moderate, 3 in snout (in young individual 2½ inches long). Scales each with a single spine; no larger spines or brush on caudal peduncle. Dorsal spine strong, inserted over front of eye, 1⅓ in head, its anterior face with 2 rows of small spinules directed downward, and a single median series directed upward; near the base of each spine of lateral series is a short branch spine directed upward; a very weak series of spines down each side of the posterior face. Gill opening slightly oblique, below posterior part of eye. Pelvic plate short, without movable portion, with 2 spines directed forward, 2 backward, and 3 on each side upward; ventral flap inconspicuous. Color uniform dull olive, the belly more silvery; caudal peduncle mottled with darker; fins plain. Known from 2 young specimens collected at St. Martins Island, West Indies, by Dr. Van Rijgersma. The above account taken from one of the types kindly sent us by Dr. Edward J. Nolan. The species is a true *Pseudomonacanthus*. (ἀμφί, all around; ὀξύς, sharp.)

Monacanthus amphioxys, COPE, Trans. Am. Phil. Soc. Phila. 1871, 477, St. Martins.

675. ALUTERA, Cuvier.

(FILE FISHES.)

Les Alutères, CUVIER, Règne Anim., Ed. I, 153, 1817 (*monoceros*).
Alutera, AGASSIZ, Spix, Pisc. Brasil., 137, 1829 (*monoceros*).
Ceratacanthus, GILL, Proc. Ac. Nat. Phila. 1861, 57 (*aurantiacus*).
Aluteres, *Alutarius*, etc., corrected spelling.
Osbeckia, JORDAN & EVERMANN, Check-List Fishes, 424, 1896 (*scripta*).

Body oblong or rather elongate, strongly compressed, covered with minute, rough scales. Mouth and teeth essentially as in *Monacanthus*, but the lower jaw more projecting, so that the lower teeth are directed obliquely upward and backward. Gill opening an oblique slit, longer than eye, situated below and in advance of eye, its posterior end behind base of pectorals. Pelvic bone long, falcate, movable under the skin, without spine at its extremity. Dorsal spine small, inserted over the eye, rough, but without barbs; soft dorsal and anal long, each of 36 to 50 rays; caudal fin convex; pectorals small. Species numerous. (α privative, λῦτήρ, a deliverer; or (according to Duméril) ἄλουτος, unwashed, sordid.)

CERATACANTHUS (κερας, horn; ακανσα, spine):
a. Dorsal rays I, 36.
  b. Anal rays 38; coloration nearly uniform. SCHŒPFII, 2135.

bb. Anal rays 38; body covered with small, round dark-brown spots. PUNCTATA, 2136.

aa. Dorsal rays about I, 46; anal rays about 50.

OSBECKIA:[*]

c. Caudal fin elongate, with rounded angles. Coloration not uniform, the head and body with irregular blue spots and lines, besides small round black spots; upper profile of snout concave. SCRIPTA, 2137.

ALUTERA:

cc. Caudal fin short, subtruncate, with acute angles. Coloration uniform; upper profile of snout convex. MONOCEROS, 2138.

Subgenus CERATACANTHUS, Gill.

2135. ALUTERA SCHŒPFII (Walbaum).

(FILE FISH; ORANGE FILE FISH; LIJA; FOOL FISH.)

Head 3⅔ in length; depth 2 in adult to 2⅓ in young. D. I, 36; A. 38. Body growing deeper with age, the outlines more convex in the adult. Eye small, about 4 in snout. Gill slit nearly twice as long as eye, its upper posterior edge nearly under middle of eye. Anterior profile very slightly convex, growing steeper with age; a slight depression at base of upper jaw. Pectoral fins scarcely ½ longer than eye; dorsal spine slender and weak, longer in the young, 2 to 3 times length of eye; dorsal and anal fins low; caudal very long in young, becoming shorter in adult, its angles rounded. Scales minute, shagreen-like, uniform over body. Coloration nearly uniform dirty olive gray, varying to orange yellow, often, especially when young, mottled above with darker bluish or dull orange; caudal sometimes dusky, edged with white, usually dull yellowish in the adult. Length 24 inches. Cape Cod to Florida and Texas; rather frequent on sandy shores, especially in the Carolinas. A large, lank fish, of unattractive form and useless as food. (Named for Dr. Johann David Schopf, an excellent botanist and an acute observer, sent as a surgeon with the Hessian troops on Long Island in the war of the American Revolution.)

Balistes schœpfii, WALBAUM, Artedi Piscium. 461, 1792, Long Island; after SCHŒPF, Berlin Ges. Naturf., VIII, 186, 1788.

Balistes aurantiacus, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 468. New York; adult.

Alutera cuspicauda, DE KAY, New York Fauna: Fishes. 338, 1842, New York; young.

Aluterus holbrooki, HOLLARD, Ann. Sci. Nat., IV, 7, 1855. North America.

Aluterus cultrifrons, HOLLARD, Ann. Sci. Nat., Ser. 4, IV, 8, pl. 1, fig. 2, 1855, "New York and Bahia."

Ceratacanthus aurantiacus, GILL, Cat. Fishes East Coast N. A., 57, 1861.

2136. ALUTERA PUNCTATA. Agassiz.

(LONG MINGO.)

Head to upper end of gill opening 3⅓ in length; depth 2⅓. D. I, 36; A. 35; orbit 4½ in head to upper end of gill opening; length of gill opening 3; caudal 2½ in body; base of dorsal 3. Profile concave; lower jaw much projecting, teeth in a single series in each jaw; eye 1⅓, its diameter below dorsal outline of body; dorsal spine (broken) situated over middle of eye a little nearer soft dorsal than tip of snout; base of soft dorsal slightly shorter than that of anal; pectoral short, equal to gill opening, its base under posterior ⅓ of gill opening and anterior margin of eye; caudal peduncle 2½ times longer than eye; caudal long and rounded behind. Color in spirits, slaty brown, darker above, covered with small round dark-brown spots, about ½ as big as pupil; snout dark; dorsal and anal dusky; caudal black. West Indies to Brazil, replacing *A. schœpfii* southward. Here described from a specimen from Jamaica about 9 inches in length.

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[*] Named for Per Osbeck, a student of Linnæus and an excellent ichthyologist, who collected in China, his Iter Chinensis first published in 1757.

Alutera punctata, AGASSIZ, Pisc. Brasil., 137, pl. 76, very bad, 1829, Brazil; CASTELNAU, Anim. Nouv. Rares., 96, 1855; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1896, 127.
? Monacanthus punctatus, GÜNTHER, Cat., VIII, 254, 1870.

Subgenus OSBECKIA, Jordan & Evermann.

2137. ALUTERA SCRIPTA (Osbeck).

(UNICORN FISH; LIJA TROMPA.)

Depth 3 to 3¼. D. I, 44 to 48; A. 47 to 52; vertebræ 7+14. Body oblong, its depth being nearly equal to distance of hind margin of orbit from extremity of snout. Snout produced, with the upper profile concave. Dorsal spine long and slender, above middle of orbit, about 1¼ in head. Middle of gill opening in advance of middle of eye; pectoral fin below posterior part of eye; caudal fin elongate, nearly as long as or longer than head, rounded; dorsal and anal fins low; ventral spine none. Head and body olivaceous, with irregular light-blue spots and curved streaks; besides these, numerous round black spots about as large as pupil; dorsal and anal yellowish; caudal reddish; skin finely velvety. Length 2 to 3 feet. Tropical seas, common in the West Indies, occasionally northward to South Carolina; also occasionally taken about the islands off the west coast of Mexico; specimens before us from Clarion Island of the Revillagigedo Archipelago, and from the Venados at Mazatlan. Apparently the American species is not distinct from the East Indian form. Should differences appear on comparison of specimens ours should stand as *Alutera lævis* (Bloch). (*scriptus*, written, from the form of markings.)

Unicornu pisces bahamensis (the Unicorn Fish), CATESBY, Hist. Nat. Carolina, etc., II, pl. 19, 1737, Bahamas.
Balistes scriptus, OSBECK, Iter Chin., I, 144, 1757, China.
Balistes monoceros, var. *scriptus*, GMELIN, Syst. Nat., 1463, 1788; after OSBECK.
Lija trompa, PARRA, Dif. Piezas Hist. Nat., 46, pl. 22, fig. 1.
Balistes lævis, BLOCH, Ichthyol., IX, 82, pl. 414, 1795, Morocco; Tranquebar.
Balistes ornatus, MARION DE PROCÉ, Bull. Soc. Philom., 131, 1822.
Aluteres pareva, LESSON, Voy. Coquille, Zoöl., 106, 1828.
Monacanthus proboscideus, RANZANI, Nov. Comm. Ac. Sc. Inst. Bonon., 1842, 8, Brazil.
Aluterus venosus, HOLLARD, Ann. Sc. Nat., Ser. 4, IV, 1855, 14, pl. 1, fig. 3, New Ireland, Bismarck Archipelago. (Coll. Lesson & Garnot.)
Alutera picturata, POEY, Proc. Ac. Nat. Sci. Phila. 1863, 183, Cuba.
Monacanthus scriptus, GÜNTHER, Cat., VIII, 252, 1870.

Subgenus ALUTERA.

2138. ALUTERA MONOCEROS (Osbeck).

(LIJA BARBUDA.)

Depth 2½ to 2¾. D. I, 48; A. 50; vertebræ 7 + 13. Body oblong; snout produced, with upper profile convex. Dorsal spine slender, short, not ½ longer than eye, above middle of orbit. Lower part of gill opening in advance of eye; pectoral fin below posterior part of orbit. Caudal fin subtruncate or double concave, with acute angles; much shorter than head, and shorter than its own peduncle; dorsal and anal fins low; ventral spine none. Skin finely velvety. Color uniform brownish olive, or grayish, finely mottled with darker, the region below dorsal with faint dusky spots amid paler reticulations. West Indies;* also recorded from the East Indies and Japan, where it is said to be rare and to be used as food. (*monoceros*, the unicorn; *μόνος*, one; *κέρας*, horn.)

Capriscus murium dentibus minutis, KLEIN, Ichth. Missus, III, 25, 1742, pl. 3, fig. 9, very bad, no locality.

Balistes monoceros, OSBECK, Iter Chinensis, 110, 1757, Asia; LINNÆUS, Syst. Nat., I, Ed. X, 327, 1758; after OSBECK.

Balistes oblongiusculus, etc., GRONOW, Zoophyl., No. 193, 1765, Indian seas.

Lija barbuda, PARRA, Dif. Piezas Hist. Nat., 48, pl. 22, fig. 2, Havana.

Balistes kleinii, GMELIN, Syst. Nat., 1788, Indian seas; after GRONOW and KLEIN.

Balistes barbatus, WALBAUM, Artedi Piscium, III, 464, 1792; after KLEIN.

Balistes monoceros, var. *unicolor*, BLOCH & SCHNEIDER, Syst. Ichth., 463, 1801; after GMELIN.

Balistes serraticornis, FRÉMINVILLE, Nouv. Bull. Sc. Soc. Philom., No. 67, 249, pl. 4, fig. 1, 1813.

Aluteres berardi, LESSON, Voyage Coquille, Zool., 108, pl. 7, 1828, New Guinea.

Alutera cinerea, TEMMINCK & SCHLEGEL, Fauna Japon., Poiss., 292, pl. 131, fig. 1, 1847, Japan.

Alutarius amphacanthus, BLEEKER, *l. c.*, 23, pl. 2, fig. 5, East Indies.

Alutarius obliteratus, CANTOR, Malayan Fishes, 353, 1850, Pinang.

Balistes linguatula, GRONOW, Cat., Ed. Gray, 35, 1854, Indian seas; after *Balistes oblongiusculus*, etc., of GRONOW.

Aluterus anginosus, HOLLARD, Ann. Sci. Nat., IV, 1855, 11, East Indies.

Balistes unicornus, BASILEWSKY, Nouv. Mém. Soc. Nat. Moscow, X, 263, 1855, China.

Alutarius macracanthus, BLEEKER, Verh. Bat. Gen., Balist., XXIV, 22, pl. 3, fig. 6, 1862, East Indies.

Alutera guntheriana, POEY, Proc. Ac. Nat. Sci. Phila. 1863, 184, Havana.

Monacanthus monoceros, GÜNTHER, Cat., VIII, 251, 1870.

Suborder OSTRACODERMI.†

(THE TRUNK FISHES.)

This group includes those Plectognaths which are without spinous dorsal and which have the body inclosed in a 3-angled, 4-angled, or 5-angled box or carapace, formed by polygonal, bony scutes, firmly joined at their edges, and with distinct teeth in the jaws. There is but 1 family, the *Ostraciidæ,* a singular offshoot from the *Sclerodermi.* (*ὄστρακον,* a hard shell, like that of an oyster; *δήρμα,* skin.)

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* The American species seems to be identical with the East Indian *Alutera monoceros*. Should differences appear on comparison of specimens, the former should apparently stand as *Alutera guntheriana*, Poey.

† For an excellent review of the species of this group, see Goode, Proc. U. S. Nat. Mus. 1879, 261. See also Hollard, "Monographie de la famille des *Ostracionides*," Annales Sci. Nat. 1857.

Family CLXXI. OSTRACIIDAE.

(The Trunk Fishes.)

Body short, cuboid, triquetrous or pentagonal, covered by a carapace formed of firmly united polygonal bony patches, the jaws, bases of the fins, and caudal peduncle free and covered by smooth skin. Mouth small; each jaw with a single series of long, narrow teeth. Maxillaries and premaxillaries firmly united. Gill opening a nearly vertical slit, below and behind the eye. Dorsal fin single, short, without spine; anal short, similar to dorsal; caudal rounded; no ventral fins; vertebræ 14, the anterior 9 elongate, the last 5 extremely short; no ribs. Genera 3; species about 20, all of the tropical seas, living near the bottom in shallow waters. The species of this group are so singular in appearance and so easily preserved that they have been common in collections ever since the collecting of tropical curiosities began. The 4 American species were well known to Artedi and Linnæus. "The locomotion of the trunk fishes is very peculiar. The propelling force is exerted by the dorsal and anal fins, which have a half rotary, sculling motion, resembling that of a screw propeller; the caudal fin acts as a rudder, save when it is needed for unusually rapid swimming, when it is used as in other fishes; the chief function of the broad pectorals seems to be that of forming a current of water through the gills, thus aiding respiration, which would otherwise be difficult on account of the narrowness and inflexibility of the branchial apertures. When taken from the water, one of these fishes will live for 2 or 3 hours, all the time solemnly fanning its gills, and when restored to its native element seems none the worse for its experience, except that, on account of the air absorbed, it can not at once sink to the bottom" (Goode.) (*Sclerodermi,* group *Ostraciontina,* Günther, Cat., VIII, 255–268, 1870.)

a. Carapace forming a continuous bridge behind the anal fin; ventral surface not carinate; caudal rays 10.
  b. Carapace triquetrous, or 3-angled, a median dorsal ridge and a ridge on each side of belly prominent; ridge on each side of back obsolete or wanting. Lactophrys, 676.

676. LACTOPHRYS, Swainson.

(Three-angled Trunk-fishes.)

Ostracion, part, Linnæus, Syst. Nat., Ed. x, 330, 1758 (many species; first restricted by Swainson to 4-angled forms, *cubicus* taken as type).

Lactophrys, Swainson, Nat. Hist. Class'n Fishes, II, 194, 324, 1839 (*trigonus,* etc.; restricted to species trigonal, with spines).

Rhinesomus, Swainson, Nat. Hist. Class'n Fishes, II, 194, 324, 1839 (*triqueter*).

Ostracion, Kaup, Archiv Naturg. 1855, 214 (*triqueter;* restricted to trigonal forms, the 4-angled forms being named *Cibotion*).

Acanthostracion, Bleeker, Atlas Ichthyol., v, 27, 1862 (*quadricornis*).

Lætophrys, Bleeker, Atlas Ichthyol., v, 27, 1862; corrected spelling.

Chapinus, Jordan & Evermann, Check-List Fishes N. and M. A., 424, 1896 (*bicaudalis*).

Trunk-fishes with the carapace 3-angled, the ventral surface flat or concave, never carinate; carapace closed behind the anal fin; carapace with or without frontal and abdominal spines; dorsal rays 9 or 10; caudal rays always 10. This genus contains 5 species, 4 of them American, and differs from the Old World genus *Ostracion* only in the form of the carapace. The median dorsal ridge of the carapace is much more developed than the others, so that the body is 3-sided and 3-angled, instead of 4-sided and 4-angled, as in *Ostracion*. Although this character is a striking one it is not one of high structural importance. Hollard and Bleeker have discarded it as being of no real systematic value. All writers agree that the species of the group are most closely related, and that the relations of the species are closer than they appear. We think, with Dr. Goode, that the shape of the carapace affords "the most reliable guide in the arrangement of the species of the genus," and we think it not improper to accord generic distinction to the 3-angled species, as distinct from the more specialized 4-angled forms. (Shortened from *Lactoria*, a milk-cow, *ὀφρύς*, eyebrow, from the projecting horns of *Lactophrys tricornis*.)

RHINESOMUS (*ρίνη*, file; *σῶμα*, body):
 a. Carapace without spines anywhere. TRIQUETER, 2139.
 aa. Carapace with distinct spines, at least on the ventral ridges behind.
  b. Frontal spines none.
  CHAPINUS (*Chapin*, the Spanish name):
   c. Carapace open behind the dorsal fin; body everywhere with round dark spots. BICAUDALIS, 2140.
  LACTOPHRYS:
   cc. Carapace closed behind the dorsal fin; body mottled with paler. TRIGONUS, 2141.
 ACANTHOSTRACION (*ἄκανθα*, spine: *ὀστρακίον*, a little box):
  bb. Frontal region with 2 strong spines like horns. TRICORNIS, 2142.

Subgenus RHINESOMUS, Swainson.

2139. LACTOPHRYS TRIQUETER (Linnæus).

(TRUNK-FISH; ROCK SHELLFISH; DRUNKEN-FISH; CHAPIN; PLATE-FISH.)

Head 4; depth 2⅕; eye 8 to 9 in total length, 4 to 4½ in height of side. D. 10; A. 10; P. 12; scales 9. Carapace trigonal, without spines; breadth equal to ½ length of body in adults, greater in young. Ventral surface of carapace convex anteriorly, concave posteriorly. Back elevated, compressed, sides joining at an angle of about 30 degrees. Carapace continuous behind dorsal fin. Interorbital space concave. Upper surface of snout concave. Teeth long, spike-like, 8 to 10 in each jaw. Scales of the sides hexagonal, in young with striæ radiating from center to angles of each scale, in adult armed simply with tubercles, 9 to 10 in longitudinal series from gill opening to tail, 8 in median line of ventral surface, 8 between ventral keel and angle of back; posterior dorsal scute unarmed. Branchial aperture oblique, its length greater than diameter of eye, descending before base of pectoral. Fins obtusely rounded; caudal of moderate length and rounded. Dark brown, thickly studded with circular spots of yellowish white, each about ⅙ of an inch in diameter; the position of these spots appears to have no relation to the shape of the plates of the carapace; ventral surface lighter and spotless; epidermis often abraded, leaving the shell uniform tawny white; lips, bases of the fins, and tail stem brown like the ground color of the body. In dried specimens the epidermis dries and loses its color, and the shell shows through with a lighter shade. Günther states that the lips, roots of the fins, root of the tail, and tip of the caudal are black. (Goode.) Length 10⅗ inches. Young in life, light olive, covered everywhere above and below with round darker spots of greenish blue about as large as pupil; fins plain; caudal peduncle with a few spots. West Indies, north to the Bermudas, Key West, and Pensacola; very common in the Tropics; a sluggish fish living on the bottoms about reefs, feeding on minute animals. (*triqueter*, three-angled.)

Ostracion polyodon inermis triqueter, LINNÆUS, Museum Adolphi-Frederici, I, 60, 1754, India.

Ostracion triqueter, LINNÆUS, Syst. Nat., Ed. X, 330, 1758, India; after Mus. Ad. Fr.; GÜNTHER, Cat., VIII, 256, 1870; GOODE, Proc. U. S. Nat. Mus. 1879, 271; JORDAN & GILBERT, Synopsis, 965, 1883.

*Ostracion** *concatenatus*, BLOCH, Ichthyol., pl. 131, 1785, Martinique; on a painting by PLUMIER.

Subgenus CHAPINUS, Jordan & Evermann.

2140. LACTOPHRYS BICAUDALIS (Linnæus).

(CHAPIN; SPOTTED TRUNK-FISH.)

D. 10; A. 10; P. 12. Ostracions with trigonal carapace and with flat prominent spine on each ventral ridge. Breadth of body less than ½ its length without caudal. Space between eyes concave. From the median dorsal line the sides of the back descend rapily, curving outward slightly. Caudal fin rounded. Color yellowish, with numerous small, round, brown spots on carapace, tail, and caudal fin. Length 16 inches. West Indies, generally common, from Cuba to Ascension Island; not yet recorded from Florida. (*bicaudalis*, two-tailed; that is, with 2 spines below the tail—"spinis subcaudalibus 2.")

Ostracion triangulatus tuberculis hexagonis radiatis, etc., ARTEDI, Genera, 57, 1738, India.

Ostracion bicaudalis, LINNÆUS, Syst. Nat., Ed. X, 330, 1758, India; after ARTEDI; GÜNTHER, Cat., VIII, 257, 1870; POEY, Repertorio, II, 442; GOODE, Proc. U. S. Nat. Mus. 1879, 274.

Subgenus LACTOPHRYS.

2141. LACTOPHRYS TRIGONUS (Linnæus).

(COMMON TRUNK-FISH; CHAPIN; SHELLFISH.)

Head 4; height of sides 2. D. 10; A. 10. Body rather sharply 3-angled; no spine before eye. Each ventral ridge with a large flat spine; dorsal ridge high and sharply compressed, descending rather rapidly forward, and ending opposite posterior margin of orbit; carapace open behind the dorsal fin. Olive gray; a very faint blue spot in the center of each of most of the scales; nostril in a yellow spot; boundaries of upper scutes blackish, of lower bluish; outlines of various scutes behind gill opening black, forming a dusky area, especially distinct in the young; a similar smaller dusky area on side on level of eye; iris yellow; fins all pale olive; vent yellow; belly light olive, outlines of the scutes bluish: base of pectorals yellowish. Length about a foot. West Indies; very common as far north as Bermuda and Key West, occasionally northward in the Gulf Stream (Holmes Hole, Mass., Storer; Woods Hole; Chesapeake Bay, Lugger). All 4 of our species occur in the harbor of Pará, in Brazil. This species and others are said to utter grunting sounds. (*τρεῖς*, three; *γόνος*, angle.)

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* As Bloch says distinctly that his account of *Ostracion concatenatus* is based on a figure by Plumier, the name should apparently not be used for an East Indian species, but is probably a synonym of *triqueter*.

Ostracion triangulatus lenibis figurararum hexagonarum eminentibus, etc., ARTEDI, Genera, 56, 1738, Jamaica; seen by Artedi in the collection of Sir Hans Sloane and in the Nagg's Head Inn, London.

Ostracium trigonus, LINNÆUS, Syst. Nat., Ed. x, 330, 1758, India; after ARTEDI; GÜNTHER, Cat., VIII, 256, 1870; GOODE, Proc. U. S. Nat. Mus. 1879, 276.

Ostracion yalei, STORER, Bost. Journ. Nat. Hist., I, 1837, 353, Holmes Hole, on Marthas Vineyard.

Lactophrys oviceps, KAUP, Archiv Naturg. 1855, 218; specimens with 10 dorsal rays, Linnæus having given by error "D. 14" in the original description of *O. trigonus.*

Ostracion undulatus, POEY, Synopsis, 441, 1868, Havana.

Ostracion expansum, COPE, Trans. Am. Phil. Soc. 1870, 474, figs. 9–10, St. Martins, West Indies.

Lactophrys trigonus, POEY, Memorias, II, 362, 1861.

Ostracium trigonum, JORDAN & GILBERT, Synopsis, 853, 1883.

Subgenus ACANTHOSTRACION, Bleeker.

2142. LACTOPHRYS TRICORNIS (Linnaeus).

(CUCKOLD; TORO: COW-FISH.)

Head 4¾; depth 2⅓. D. 10; A. 10. Carapace trigonal; adults with a broad low ridge on each side of the back, the dorsal ridge more elevated than in the young, which are somewhat tetragonal. Ventral surface nearly flat; angles of body carinate; a stout spine directed forward over each eye; abdominal spines flat, directed backward; a median dorsal spine said to be sometimes present, never persistent, none in our specimens; bridges behind dorsal and anal each ending in a flat spine; caudal peduncle with or without a free plate* above or below; carapace closed behind dorsal fin. Color brown, yellow, blue, or green, with irregular blue blotches, the centers of the scutes often lighter than the margins. Young, light gray, tinged with olive; belly white; head and carapace with round spots of rather light blue, these sometimes forming more or less interrupted longitudinal stripes; about 4 of these stripes on cheek; tail above with blue, brown-edged spots; dorsal olive, its base blackish; caudal olive, edged and mottled with light blue; anal similar; pectorals olive. Length 18 inches. Tropical parts of the Atlantic; very common from Carolina to Brazil, ranging northward in the Gulf Stream to Charleston (Goode) and Chesapeake Bay (Lugger); occasional about the shores of the Gulf of

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* "Out of 14 specimens examined 5 had plates above and below, 1 had 2 above, and 6 had none." (Goode.)

Mexico, at Pensacola and Galveston; also ranging eastward to Guinea and the Cape of Good Hope. It is rarely brought to the markets, but is said to be a good food-fish when baked in the shell. (*tres*, three; *cornus*, horn; the name refers to the 2 frontal horns and to the supracaudal plate, figured by Lister as an erect spine, the figure apparently based on a specimen with the plate torn loose at one end.)

Piscis triangularis capiti cornutus cui e media cauda cutanea aculeus longus erigitus, LISTER, in Willughby, Hist. Pisc., Appendix, 19, 1686, locality not given.

Ostracion triangulatus aculeis duobus in capite et unico longioro superne ad caudaum, ARTEDI, Genera, 56, 1738; after LISTER in Willughby.

Ostracion triangulatus duobus aculeis in fronte et totidem in imo ventre subcaudalesque binis, ARTEDI, Genera, 56, 1738; specimens seen in London at the house of Mr. Lillja and in the Nagg's Head Inn.

Ostracion tricornis, LINNAEUS, Syst. Nat., Ed. x, 331, 1758; after ARTEDI.

Ostracium quadricornis,* LINNAEUS, Syst. Nat., Ed. x, 331, 1758; after ARTEDI; GÜNTHER, Cat., VIII, 257, 1870; GOODE, Proc. U. S. Nat. Mus. 1879, 278.

Ostracion listeri, LACÉPÈDE, Hist. Nat. Poiss., I, 468, 1798; after WILLUGHBY.

Ostracion sexcornutus, MITCHILL, Amer. Monthly Mag., II, 1818, 328, Mouth of Mississippi River.

Ostracion maculatus, HOLLARD, Ann. Sci. Nat. 1857, 149.

Ostracion guineensis, BLEEKER, Ned. Tydskr. Dierk, II, 298, Guinea.

Ostracion gronovii, BLEEKER, Ned. Tydskr. Dierk, II, 298.

Acanthostracion polygonius, POEY, Enumeratio, 175, 1876, Cuba.

Ostracium quadricorne, JORDAN & GILBERT, Synopsis, 854, 1883.

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* Concerning the nominal species of this type, Dr. Goode remarks: "I have never seen more than one species of this type, and the synonymy at the head of this notice expresses the views of the majority of ichthyologists as well as my own. It seems only fair, however, to quote the opinion of Dr. Bleeker. 'It appears to me very evident,' wrote he, 'that there are at least 5 species of triangular (or rather pentagonal) *Ostracions* with frontal and preanal spines. Of these this (*O. quadricornis*) is the one longest known, and may be easily distinguished by the nearly vertical profile of the head as well as by the strong spine which terminates the postero-superior dorsal plate. The other species resembling *quadricornis* are *Ostracion notacanthus* Bleeker, *Ostracion tricornis* L. (=*Ostracion maculatus* Hollard), *Ostracion gronovii* Bleeker, and *Ostracion guineensis* Bleeker, but none of these exhibits the remarkable character of the postero-superior dorsal angle developed into a spine. *Ostracion notacanthus* is characterized by the presence of a spine upon the dorsal crest, by its oblique profile, and by the hexagonal or irregular black ring with large yellowish center which is plainly visible upon each plate of the back and the flanks; while *Ostracion gronovii* is easily recognized by the greater length of the frontal and preanal spines, by the absence of the median dorsal spine, and by the very oblique profile of the snout. *Ostracion tricornis* Linn., which appears to be identical with the species described by Hollard as *Ostracion maculatus*, is marked by its nearly vertical profile and by longitudinal brown bands upon the cheeks. *Ostracion guineensis* is marked by the subvertical profile of *Ostracion tricornis*, but has cheeks without bands, and the plate of the carapace ornamented with a central ocella of pearl color or blue.' The presence of plates upon the caudal peduncle is apparently accidental. They may possibly have some relation to sex, but certainly none to age. Out of 14 specimens examined 5 had plates above and below, 1 had 2 above, and 6 had none. In none of the specimens can I distinguish traces of the spine in the middle of the dorsal ridge mentioned by Dr. Günther. The color of young specimens is well described by Günther; the bands on the cheek are, however, of a bright blue. Adult specimens are colored in a rich bright blue or green, lighter in the center of each hexagonal plate, giving the appearance of annular markings, which quickly vanish after death. In some individuals the color is worn from the ridges of the carapace, leaving patches of light brown. Bleeker claimed for his species, *Ostracion notacanthus*, a peculiar system of coloration, but it is in nowise different from that of the ordinary type of *Ostracion quadricornis*.[1] The largest specimens are 21 inches long." If Dr. Goode is right in referring all these forms to one species, it should be called *Lactophrys tricornis*. The only doubt seems to be in regard to *Lactophrys notacanthus*, which looks to us like a different fish.

[1] "Mais en outre le système de coloration de l'espèce que je crois nouvelle est très différent, chaque bouclier de la tête, du dos et des flancs étant orné d'un anneau violet ou noirâtre d'une forme hexagone, pentagone, quadrangulaire, ou même ronde, et à centre large orange ou rougeâtre. On ne voit rien de pareil sur le corps du quadricornis. Puis encore, la queue est brunâtre et a taches jaunâtres et les pectorales ont un rayon de plus. Je nomme cette espèce nouvelle *Ostracion notacanthus*." Mémoire sur les Poissons de la Côte de Guinée, par P. Bleeker, p. 21.

Suborder GYMNODONTES.

Plectognaths without a spinous dorsal, with the body short and with the belly inflatable; the scales typically spiniform, with root-like insertions (archetypically rhomboid), and with the jaws in an enamel-like covering enveloped without distinct teeth. This group contains degraded Plectognaths which have lost the scales, spinous dorsal, and distinct teeth. In the extreme forms the pelvis, ribs, and caudal vertebræ are also lost, the species depending on their dermal armature, leathery skin, or inflatable belly for protection from enemies, while little power of active movement remains. (*γυμνός*, naked; *ὀδούς*, tooth.)

- *a.* Pelvis and ribs obsolete.
  - *b.* Caudal region normally developed, with a caudal peduncle.
    - *c.* Upper and lower jaw each divided by a median suture; maxillaries and dentaries each curved outward behind the premaxillaries; ethmoid more or less projecting in front of frontals; postfrontals extending outward at least as far as frontals.
      - *d.* Vertebræ comparatively few, 15 to 21 in number;* dorsal and anal short, of 7 to 15 rays.
        - *e.* Frontal bones articulated with the supraoccipital and postfrontals confined to the sides; ethmoid short, narrow, little prominent to view above; vertebræ few; head broad; nostrils various. TETRAODONTIDÆ, CLXXII.
        - *ee.* Frontal bones separated from the supraoccipital by the postfrontals which meet in the middle; ethmoid prominent above, enlarged and narrowed forward; snout pointed; dorsal and anal very short; nostrils obsolete. CANTHIGASTERIDÆ, CLXXIII.
    - *cc.* Upper and lower jaw each undivided, the premaxillary and dentary bones coosified into sutureless arches; maxillaries extended laterally behind; body covered with stout, rooted spines. DIODONTIDÆ, CLXXIV.
  - *bb.* Caudal region of body aborted, the body truncated behind the dorsal and anal; jaws each without median suture. MOLIDÆ, CLXXV.

Family CLXXII. TETRAODONTIDÆ.

(THE PUFFERS.)

Body oblong or elongate, usually little compressed, sometimes very broad; head and snout broad; belly capable of great inflation; skin scaleless, usually more or less prickly, the spines or prickles usually weak and movable, not rooted; in 1 genus (*Ephippion*) the skin is armed with bony scutes forming a sort of carapace, approaching that seen in *Ostracion:* each jaw confluent, forming a sort of beak which in each jaw is divided by a median suture; maxillaries curved outward behind the premaxillaries; lips full; nostrils various. Spinous dorsal and ventral fins wanting, the fins composed of soft rays only; dorsal fin posterior, opposite and similar to anal; caudal fin distinct, no ventral fins, the pelvic bone undeveloped; no ribs; pectoral fins short and broad, the upper rays longest; caudal fin and its vertebræ normally developed. Medifrontals articulated with the supraoccipital, the postfrontals confined to the sides, ethmoid more or less projecting in front of frontals; postfrontals extending outward as far as frontals; prosethmoid short and narrow, little prominent to view above; vertebræ few, 7 or 8 + 9 to 13. Gill openings small, placed close in front of pectorals; air bladder present. Genera about 10, species about 60, inhabiting warm seas; fishes of sluggish movements, noted for their habit of filling the stomach with air. When disturbed they then float on the surface belly upward. Not used as food, the flesh being ill flavored and reputed poisonous. (*Tetrodontina*, part, Günther, Cat., VIII, 270–316, 1870.)

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* The *Chonerhinidæ* of the East Indies have vertebræ 29; D. 32 to 38; A. 28 to 32.

TETRAODONTINÆ:

a. Frontal bones expanded sidewise and forming the lateral roofs of the orbits, the postfrontals limited to the posterior portions. Species chiefly marine.

b. Nostril on each side with 2 distinct openings; frontal region longer than broad.

c. Dorsal and anal fins comparatively long, falcate, each of 12 to 15 rays; caudal lunate; vertebræ about 8 + 13 = 21; nostrils sessile, or nearly so, not forming a distinct papilla; mucous tubes on upper part of head and on sides of body very conspicuous. LAGOCEPHALUS, 677.

cc. Dorsal and anal fins comparatively short, rounded, each of 6 to 8 rays; caudal usually rounded; vertebræ about 8 + 10 = 18; nostrils at the summit of a hollow, simple (or lobed) papilla; mucous tubes inconspicuous. SPHEROIDES, 678.

bb. Nostril on each side with a bifid tentacle without distinct opening; frontal region broader than long; fins and vertebræ as in *Spheroides*. OVOIDES, 679.

COLOMESINÆ:

aa. Frontal bones narrowed and excluded from the orbit, the postfrontals being elongated and projected forward and connected with the prefrontals; dorsal and anal fins short, rounded; snout very obtuse; vertebræ 8 + 11 = 19; nostrils (probably) as in *Spheroides*. Fluviatile species. COLOMESUS, 680.

677. LAGOCEPHALUS, Swainson.

Lagocephalus, SWAINSON, Nat. Hist. and Class'n Fishes, II, 194, 328, 1839 (*pennanti* = *lagocephalus*).

Physogaster, MÜLLER, Abhandl. Akad. Wiss. Berlin, 252, 1839 (1841) (*lunaris*); name preoccupied.

Gastrophysus, MÜLLER, Wiegmann's Archiv, IX, 1843, 330 (*lunaris*).

Les Promecocephales (*Promecocephalus*), BIBRON, Revue de Zoologie, 279, 1855 (*argentatus*).

Tetrodon, GILL, Cat. Fish. East Coast N. A., 15, 1873 (*lævigatus*); not of LINNÆUS, as properly restricted.

Body comparatively elongate; skin smooth or variously prickly, the prickles most developed on the abdomen; abdomen capable of very great inflation. Dorsal and anal rather long, falcate, of 12 to 15 rays each; caudal lunate. Nostril without distinct papilla, each one with 2 distinct openings; mucous tubes on upper part of head and on sides of body very conspicuous. Lower side of tail with a fold. Species reaching a rather large size, chiefly tropical, one of them, *Lagocephalus lagocephalus* L., reaching the coasts of southern Europe. Vertebræ in increased number (about 8 + 13 = 21). The increased number of vertebræ and of rays in the vertical fins mark a transition toward the allied family, *Chonerhinidæ*, in which there are about 29 vertebræ, the dorsal rays about 35, the anal 30. (*λάγος*, hare; *κεφαλή*, head, from the incisor teeth.)

a. Body elongate; head 3¼ in length; depth 4¼. LÆVIGATUS, 2143.

aa. Body stout; head 2⅝ in length; depth 3½. PACHYCEPHALUS, 2144.

2143. LAGOCEPHALUS LÆVIGATUS (Linnæus).

(SMOOTH PUFFER.)

Head 3¼; depth 4½. D. 14; A. 12. Eye large, silvery, 2 in snout. Body elongate, tail slender, a fold of skin on its lower edge on each side. Interorbital space flat, shorter than snout, 1½ in eye. Belly covered with large, subequal, 3-rooted spines, well separated, no smaller ones intermixed; back and sides smooth. Gill opening midway between snout and front of dorsal. Dorsal and anal fins large and falcate, the last rays rapidly shortened; height of dorsal 1¾ in head; caudal fin lunate, the longest ray 1½ in head. Olive green above, sides and below lustrous silvery white; no distinct markings. Length 2 feet. Cape Cod to Brazil; common southward; rather rare north of Cape Hatteras. (*lævigatus*, smoothed.)

Ostracion cathetoplateo oblongus, ARTEDI, Genera Pisc., genus 58, species 13, 1738; after *Orbis lagocephalus*, GREW, etc.

Tetrodon lævigatus, LINNÆUS, Syst. Nat., Ed. XII, 411, 1766, Charleston, South Carolina (Coll. Dr. Garden); GÜNTHER, Cat., VIII, 274, 1870.

Tetrodon curvus, MITCHILL, Trans. Lit. and Philos. Soc., I, 1815, 474, New York; young.

Tetrodon mathematicus, MITCHILL, Trans. Lit. and Philos. Soc., I, 1815, 474, New York.

Holacanthus melanothus, GRONOW, Syst. Nat., Ed. Gray, 24, 1854, Carolina; based on *Tetraodon lævigatus* of Linnæus.

Tetrodon lineolatus, POEY, Synopsis, 432, 1868, Cuba; young.

Lagocephalus lævigatus, JORDAN & GILBERT, Synopsis, 860, 1883; JORDAN & EDWARDS, Proc. U. S. Nat. Mus. 1886, 232.

2144. LAGOCEPHALUS PACHYCEPHALUS (Ranzani).

(JUG-FISH.)

Head 2⅚; depth 3½; eye 3⅖. D. 14; A. 13; P. 17. Body heavy, tapering from middle of head backward; snout blunt; length of caudal peduncle equal to head in front of middle of pupil. Vertical diameter of eye ⅘ of horizontal diameter. Interorbital space slightly concave, 2 in distance from end of snout to middle of pupil; distance between eyes equal to snout. Gill opening vertical, broader than base of pectoral. Nuchal cross line of mucous pores halfway between snout and origin of dorsal, and ⅓ the distance to base of caudal. Dorsal and anal alike and opposite, both somewhat falcate, the last ray about 4½ in longest, which is 1⅚ in head; pectoral very broad, the margin oblique, slightly sinuous, lowest ray ¾ longest, which is as long as snout, 2 in head, the fifth ray from bottom shortest. Upper and lower rays of caudal slightly produced, middle rays even, upper lobe larger, as long as caudal peduncle, 1½ in head; folds on lower part of side of tail extending forward and meeting on chin, a very slight fold on each side of tail above. Small, embedded, 3-rooted spines on the belly between the lateral ridges, not extending on to chin nor to vent, skin otherwise perfectly smooth. Lines of mucous pores as in *Lagocephalus lævigatus;* 4 short lines inclosing a quadrangular area behind the eye, from the anterior corners of which extends a line surrounding the eye, the posterior inner corners connected by the nuchal line, the lateral line extending from the posterior outer corner. Lateral line extending directly backward till nearly even with the dorsal fin, then curving downward and extending along middle of the tail to base of caudal. Color in alcohol, silvery, olive above, clouded with dark olive, a faint greenish-olive area along sides; lower part of side silvery; below white. This species differs from *Lagocephalus lævigatus* in the robust body with short caudal peduncle, the merely emarginate caudal fin, and the shape of the pectoral. West Indies to Brazil; not common. Here described from 2 specimens, 9½ inches long, from Jamaica (Coll. J. S. Roberts). (*παχυς*, thick; *κεφαλή*, head.)

Tetrodon pachycephalus, RANZANI, Nov. Comm. Ac. Sci. Inst. Bonon., IV, 1840, 73, pl. 11, fig. 2, Brazil.

Lagocephalus pachycephalus, JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 128.

678. SPHEROIDES, Lacépède.

(SWELL-FISHES.)

Les sphéroides, LACÉPÈDE, Hist. Nat. Poiss., II, 1, 1798 (French name only; *tuberculé*).

Spheroides, DUMÉRIL, Zoologie Analytique, 342, 1806 (*tuberculatus*=*spengleri*, from a drawing showing a front view).

Orbidus, RAFINESQUE, Analyse de la Nature, 90, 1815 (substitute for *Les sphéroides*, LACÉPÈDE).

Sphæroides, LACÉPÈDE, Pillot Edition, Hist. Nat. Poiss., VI, 279, 1831, (*tuberculatus*=*spengleri*).

Cirrhisomus, SWAINSON, Nat. Hist. Class'n Fishes, II, 194, 328, 1839 (*spengleri*).

Cheilichthys, MÜLLER, Abhandl. Akad. Wiss. Berlin, 252, 1839 (1841) (*testudineus*).

Holacanthus, GRONOW, Syst. Nat., Ed. Gray, 23, 1854 (includes all *Tetrodontidæ* and *Diodontidæ*); name preoccupied.

Anchisomus, KAUP MS., RICHARDSON, Voyage Herald, 156, 162, 1854 (*spengleri*, etc.).

Les stenometopes (*Stenometopus*), BIBRON, Revue de Zoologie 1855, 279 (*testudineus*); no diagnosis.

Apsicephalus, HOLLARD, Études sur les Gymnodontes, 324, 1867 (*testudineus*, etc.).

Body oblong, not elongate; skin variously prickly or smooth, sometimes with cirri. A single, short, simple nasal tube on each side, with 2 rather large openings near its tip. Dorsal and anal fins short, little falcate, of 6 to 8 rays each; caudal truncate or rounded, rarely slightly concave. Vertebræ 8+10=18. Frontal bones expanded sidewise and forming the lateral roof of the orbit, the postfrontals limited to the posterior portions. Species numerous, in warm seas; largely American. Our species represent 2 well-marked subgenera, the extremes of which appear very different from each other so far as the skulls are concerned. Some of the typical species of *Spheroides* approach *Canthigaster* in the narrowness of the frontal area. (*σφαίρος*, sphere; *εἶδος*, resemblance; the genus based on a front view, in which the fish was represented as spherical.)

SPHEROIDES:

- *a.* Skull very narrow above, the interorbital area more or less concave, 2½ to 6½ times in the length of the long snout, 5 to 12 times in head; sides of body usually with small dermal flaps.
  - *b.* Interorbital area very deeply concave, channel-like in the adult, slightly concave in the young.

c. Back and belly without prickles in the adult; 2 rather large dermal flaps behind head, 1 on each side; coloration nearly uniform, the sides of belly with or without dark blotches. ANGUSTICEPS, 2145.

cc. Back and belly more or less prickly; dorsal cirri smaller and further apart, often wanting; color not uniform, the sides with a series of round dark blotches; the back green, mottled or spotted with maroon and sky blue. LOBATUS, 2146.

bb. Interorbital space flat or moderately concave; no dorsal flaps; sides with a series of about 12 black blotches or bars bounding pale color of abdomen; back without curved cross streaks; upper ray of caudal produced.

d. Sides of head and body always smooth except sometimes a strip behind pectorals; spines larger, higher, more stellate, wider apart than in *Spheroides maculatus*, irregularly placed and often wholly wanting; sides usually with small dermal slips or flaps, especially in the young; black blotches on sides nearly round; caudal with a broad dusky bar on base and tip. SPENGLERI, 2147.

dd. Sides of head and body always prickly, as is the back from upper lip to base of dorsal; belly prickly, the prickles all similar, small, 3-rooted, stiff and close set, never obsolete; no cirri; back with dark spots; black blotches on sides forming short oblique cross bars, those behind pectoral most conspicuous; caudal nearly plain, darker at tip.

e. Color dark brown, with black blotches; a series of about a dozen irregular black spots along under side. MACULATUS, 2148.

ee. Color dark, olivaceous above; black blotches on lower part of sides in the form of short, oblique cross bars. MARMORATUS, 2149.

CHEILICHTHYS (χεῖλος, lip; ἰχθύς, fish):

aa. Skull very broad above, the interorbital space broad, flattish, or very little concave, its width more than $\frac{1}{2}$ snout and $2\frac{2}{3}$ to 4 in head; sides with no series of dark blotches bounding the line of belly.

e. Caudal fin rounded or subtruncate; back and sides with many small irregular black spots; no series of larger blotches bounding the edge of the belly.

f. Dark shades on back, broad, appearing as the ground color and crossed by pale curved cross bars and streaks forming arcs of concentric circles; these sometimes broken by reticulations, everywhere profusely spotted with black in adult; body rather sparsely prickly above and below or sometimes entirely smooth.

g. Interorbital space moderate, slightly concave; snout somewhat produced, the eye a little behind middle of head; pale markings usually irregular, not forming continuous arcs. TESTUDINEUS, 2150.

gg. Interorbital area very broad, nearly flat; snout short and bluntish, the eye nearly midway in head; pale markings comparatively regular, forming distinct arcs. ANNULATUS, 2151.

ff. Dark shades on back appearing as bars and spots on a pale ground color, the pale areas forming more or less distinct concentric streaks; the dark areas above large black confluent blotches which form above curved streaks and cross bars, irregular and variable but sharply marked; interorbital space very broad and slightly convex; back and belly prickly. FORMOSUS, 2152.

ee. Caudal fin lunate or truncate, with the angles acute or produced.

h. Dorsal rays 8; body more or less prickly, above and below.

i. Color brownish above with irregular grayish spots, and sometimes dark cross bands; eye equal to interorbital width. FURTHI, 2153.

ii. Color brownish above, vermiculated with paler; eye broader than interorbital space (in young of 4 inches). TRICHOCEPHALUS, 2154.

hh. Dorsal rays 10. Body (in adult) everywhere perfectly smooth; interorbital space broad, equal to snout and twice diameter of eye; brown, with darker spots above. PACHYGASTER, 2155.

Subgenus SPHEROIDES.

2145. SPHEROIDES ANGUSTICEPS (Jenyns).

Head 2½; depth 3½ (when not inflated). D. 8; A. 7. Body comparatively elongate, the snout very long, concave in profile, a little longer than rest of head; eye large, 2 to 3 in snout. A well-marked pair of small dermal flaps, black in color, 1 on each side of median line of back, behind the occiput, and just behind gill opening, the two close together; interorbital area very narrow, deeply concave, channel-like, not so broad as eye, the width of its bony part 6½ in snout, about 12 in head; supraorbital bone prominent. Sides with a few small whitish dermal cirri or flattish flaps, irregular in size and position, sometimes wanting; our adult examples (Galapagos Islands) entirely smooth, the skin everywhere rough velvety; nostrils tubular, with 2 lateral openings near the summit. Caudal gently rounded, the middle rays longest; a slight trace of fold on caudal peduncle; pectoral broad, rounded, the upper rays longest. Skin on back and sides tending to form oblique lengthwise wrinkles. Color of adult, dark smoky gray, nearly uniform, the belly scarcely pale; base of fins dusky; no trace of lateral blotches. Pacific coast, from La Paz to the Galapagos Islands; rather rare. Here described from 2 adult examples (9 and 10 inches long) from Chatham Island of the Galapagos. One of these has the eye larger, the snout shorter, and the interorbital space much deeper than the other, a difference perhaps sexual. Both are uniformly colored and without prickles. (*angustus*, narrow; *ceps*, head.)

Tetrodon angusticeps, JENYNS, Voyage Beagle, Fishes, 154, pl. 28, 1842, Galapagos Islands (Coll. Charles Darwin); large specimens in poor condition, the skin not prickly; GÜNTHER, Cat., VIII, 287, 1870; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 631.
Anchisomus angusticeps, RICHARDSON, Voyage Herald, Fishes, 159, 1854.
Sphæroides angusticeps, JORDAN & EDWARDS, *l. c.*, 236.

2146. SPHEROIDES LOBATUS (Steindachner).

(BOTETE.)

Head about 3; depth about 4; eye moderate, about 5 in head. D. 7; A. 7. General form of *Spheroides angusticeps*, the body elongate, the head long, the long snout 2 in head, its profile concave; interorbital space narrow, deeply concave, the width of its bony portion 4 to 5 in snout, 7 to 10 in head; nostrils small, papilliform, each with 2 openings, essentially as in *Spheroides spengleri;* a slight trace of fold on caudal peduncle; black post-nuchal dermal flaps sometimes present, these farther apart than in *S. angusticeps*, and often wanting; sides with flattish dermal flaps, pale in color, rather numerous, but irregularly scattered. A rhombic saddle of sharp 2-rooted spines on back, from nape to behind gill opening, thence back to near front of dorsal; a small patch in posterior part of gill opening; belly velvety, with rather sharp, partly embedded spines from throat to vent; head, sides, and caudal peduncle without spines. Caudal short, rounded, 1½ in head; dorsal small; pectoral broad truncate, the upper rays scarcely longer than the lower. Color dark green, usually bright, with many irregular, small, well-defined, bluish and maroon-colored spots above; a row of small, diffuse blackish blotches along lower part of sides of head and body, some faint dark clouds above; a dark blotch at base of pectoral and of caudal. Gulf of California to the Galapagos; common in shallow water about Mazatlan, the largest example seen 10 inches long, from *Albatross* Station 3006. In this the dermal flaps are obsolete. In 1 from La Paz these flaps are as distinct as in *Spheroides angusticeps*, but farther apart. Some from Panama have the sides of head and body prickly. There is considerable variation in other respects. The species may prove inseparable from *Spheroides angusticeps*, representing the young, the other the extreme of adult variation. (*lobatus*, lobed, from the lateral flaps.)

Canthogaster? lobatus, STEINDACHNER, Ichthyol. Notizen., x, 18, pl. v, fig. 3, 1870, Altata.
Spheroides lobatus, JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 490.

2147. SPHEROIDES SPENGLERI (Bloch).

(SOUTHERN PUFFER; SWELL TOAD; TAMBOR.)

Head 3. D. 7; A. 6. Head compressed, narrow; interorbital space very slightly concave, or flattish with a slight median ridge, narrow, about ½ as broad as eye, its width 5 to 6 in head, 2½ to 3 in snout, which is 2 in head; profile of snout not steep. Body variously prickly, sometimes smooth, usually a patch of minute spines from occiput halfway to dorsal fin; belly spinous to near the vent; skin of head, tail, and most of the skin of the sides smooth; sides usually with small dermal cirri, especially in the young, these not very conspicuous. Young examples have the back and belly covered with rather large, not close set, stellate prickles as described in the original account of *Tetrodon nephelus*. Of the larger individuals, some have prickles only on the back, others on the belly only; 1 or 2 only on a small area behind the eyes near the median line, while the majority of the largest are entirely smooth. There is no doubt that these all belong to one species. The loss of the prickles is probably to some extent dependent on age. Adult olive brown, with numerous small light-bluish or greenish spots everywhere, many of them forming ocelli around darker spots of the ground color; numerous scattered black spots as large as the pupil, one in axil below most distinct; some obscure dark spots along sides of belly, this region being flesh color, with pale rivulations; pectorals yellowish; caudal pale, usually with 2 dusky shades. Young, gray and olive above, much mottled with blackish; back with numerous irregular blue spots; iris coppery, the pupil green; belly white, grayish brown along the sides; 12 round blackish spots along the boundary between sides and belly; a whitish bar at base of caudal; caudal with 2 bars of blackish olive and 1 of white; other fins plain; back and sides with whitish cirri. West Indies, very common, ranging north to coast of Texas and western Florida, south to Rio Janeiro and to the Madeiras and Canaries; the most widely distributed species of the family. Length 1 foot. (Named for Mr. Spengler, of Copenhagen, who sent the type specimen to Bloch.)

Tetrodon spengleri, Bloch, Ichthyologia, I, 135, pl. 144, 1782, East Indies; Günther, Cat., VIII, 284, 1870; Poey, Enumeratio, 173, 1875; Jordan & Gilbert, Synopsis, 681, 1883.

Le Tetrodon plumier, Lacépède, Hist. Nat. Poiss., I, 504, 1797, Martinique; on a drawing by Plumier.

Le Sphéroide tuberculé, Lacépède, Hist. Nat. Poiss., II, 1, 1798, Martinique; on a front-view drawing by Plumier.

Tetrodon plumieri, Bloch & Schneider, Syst. Ichth., 508, 1801, Martinique; after Lacépède.

Sphæroides tuberculatus, Pillot Edition of Lacépède, VI, 279, 1831, Martinique.

Tetrodon turgidus, Poey, Synopsis, 432, 1868, Cuba; not of Mitchill.

Tetrodon nephelus, Goode & Bean, Proc. U. S. Nat. Mus. 1882, 412, Indian River and Pensacola, Florida (Types, No. 31427 and 31428 from Indian River (Coll. R. Edward Earll) and 26570 (Coll. Silas Stearns)); Jordan & Gilbert, Synopsis, 966, 1883.

Tetrodon turgidus nephelus, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 306.

Spheroides spengleri, Jordan & Edwards, *l. c.*, 237.

2148. SPHEROIDES MACULATUS (Bloch & Schneider).

(Puffer; Swell Toad; Blower.)

Head 2⅔; depth 3; eye small, 9 in head; interorbital width 3½; snout 1¾. D. 7; A. 6; C. 7. Body about as wide as deep when not inflated; interorbital space somewhat concave; profile not very steep, depressed in front of eyes. Sides of head and body always prickly, as is the back from upper lip to base of dorsal; belly prickly from lower lip to vent; prickles all similar, small, mostly 3-rooted, stiff and close set, rather largest posteriorly on back and belly, never obsolete; sides without cirri. Caudal slightly rounded. Color dark olivaceous above, somewhat marbled and dotted with black; black blotches on lower part of sides in the form of short cross bars, somewhat oblique, the first one behind pectoral most conspicuous; caudal fin plain or nearly so, the tip darker. Close to *Spheroides spengleri*, the spines smaller, closer together and never wanting; no cirri. Length 6 to 10 inches. Atlantic coast of the United States, from Cape Ann to Florida; very common northward, replacing the closely allied *S. spengleri*. The only species of the genus common outside the Tropics. (*maculatus*, spotted.)

Toadfish, Schöpf, Beobacht. Gesellsch. Naturf. Freunde, VIII, 189, 1788, Long Island.

Tetrodon hispidus, var. *maculatus*, Bloch & Schneider, Syst. Ichth., 504, 1801, Long Island; after Schöpf.

Tetrodon turgidus, Mitchill, Trans. Lit. and Phil. Soc., I, 1815, 473, pl. 5, f. 5, New York; Günther, Cat., VIII, 285; Jordan & Gilbert, Synopsis, 861, 1883.

Spheroides maculatus, Jordan & Edwards, *l. c.*, 238.

2149. SPHEROIDES MARMORATUS (Ranzani).

(Spiny-back Blow-fish.)

Head 2¾; depth 4; eye 4½ in head; snout long, 1⅔ in head. D. 7; A. 6; P. 14. Outline of head concave in front of eye; eye full and high, its distance above a line drawn from corner of mouth to upper base of pectoral equal to its longitudinal diameter. Interorbital space very narrow, grooved, its width equal to that of pupil. Nostrils at end of a tube, situated about equally distant from end of snout and posterior edge of eye. Gill opening equal to base of pectoral, but higher. Length of caudal peduncle from anal 2 in head. Length of head equal to $\frac{1}{2}$ of distance in front of dorsal. Posterior rays of dorsal $1\frac{1}{2}$ in longest, which are $2\frac{1}{2}$ in head. Pectoral very broad, folding fan-like, the margins scalloped, broadly rounded, lowest ray $1\frac{4}{5}$ in upper, which is $2\frac{3}{4}$ in head. Caudal fin slightly longer than the distance of its base from dorsal, its rays all of equal length, $1\frac{4}{7}$ in head. Prickles on ventral surface between chin and vent, extending on side of head in front of pectoral fin, on side behind pectoral fin to vertical from dorsal, above from nostrils to dorsal; only the snout, axil of pectoral, and caudal peduncle naked. Lateral line very faint, extending obliquely upward from side of snout under eye, then backward, curving slightly downward under dorsal, most distinct on side of tail. Color in alcohol, above very dark brown, with black blotches, the sides lighter, with very pale reticulations, a series of about a dozen irregular black spots along lower side; below white; caudal slightly dusky, with no indications of bars; other fins colorless. This species differs from *Spheroides spengleri* in the high and prominent eye, the very narrow interorbital, the strongly concave outline of snout, the extensive distribution of prickles, and in color. West Indies to Brazil; our specimens collected at Kingston, Jamaica, by Rev. Joseph S. Roberts. (*marmoratus*, marbled.)

Tetrodon marmoratus, RANZANI, Nov. Comm. Ac. Sci. Inst., Bonon., IV, 1840, 72, pl. 10, fig. 1, Brazil.
Spheroides marmoratus, JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 129.

Subgenus CHEILICHTHYS, Müller.

2150. SPHEROIDES TESTUDINEUS (Linnæus).

(TAMBOR; GLOBE FISH.)

Head 3; snout moderately long, 2 in head; eye small, about $7\frac{1}{2}$ in head, nearer gill opening than end of snout; interorbital width 4 in head. D. 8; A. 6; skin of back from nape to before dorsal fin covered with small, sparsely set prickles; belly from throat to anal with prickles which are rather large and closely set; axil usually prickly; these prickles rarely wanting or obscured; sides sometimes with cirri. Back dark olivaceous, with whitish curved lines and streaks paler than the ground color, these streaks usually arranged as follows: a circle or rhomb on the middle of back, in front of dorsal fin, this surrounded by an ellipse, the ellipse sometimes broken up by cross streaks; before this 3 or 4 cross streaks extending downward and backward, the one at the nape and the one behind the eyes connected on the median line; back and sides with many irregular, round, blackish spots of different sizes; a dark bar at base of pectoral; caudal dusky at base, then pale, the posterior $\frac{1}{2}$ blackish; skull not very broad, the interorbital area somewhat concave, the prefrontal grooves narrow. West Indies; very common; occasionally ascending rivers; ranging occasionally northward in the Gulf Stream as far as Newport. (*testudineus*, like a turtle, *Testudo*, from the form of the jaws; "*orbis oblongus testudinis capite*" of Clusius.)

Ostracion oblongus glaber, ARTEDI, Genera Piscium, genus 60, 1738; after CLUSIUS, WILLUGHBY, etc., BALK, Amoen. Acad., I, 591, 1749.

Orbis lævis variegatus (the Globe Fish), CATESBY, Nat. Hist. Carolina, pl. 28, 1743, Virginia.

Tetraodon testudineus, LINNÆUS, Syst. Nat., Ed. X, 332, 1758; based on BALK and ARTEDI.

? *Tetrodon punctatus*, BLOCH & SCHNEIDER, Syst. Ichth., 506, 1801, Brazil; POEY, Synopsis, 432, 1868.

Tetrodon geometricus, BLOCH & SCHNEIDER, Syst. Ichth., 508, 1801, Virginia; after CATESBY.

Tetrodon ammocryptus, GOSSE, Nat. Sojourn Jamaica, 287, 1851, Jamaica.

Anchisomus reticularis (KAUP) RICHARDSON, Voyage Herald, 161, pl. 31, 1854; not *Tetrodon reticularis*, BLOCH & SCHNEIDER, which is *Tetrodon testudineus*, BLOCH, not of LINNÆUS.

Holacanthus leionothos, GRONOW, Cat. Fishes, Ed. Gray, 24, 1854, American Ocean.

Tetrodon testudineus, GÜNTHER, Cat., VIII, 282, 1870; POEY, Enumeratio, 172, 1872; JORDAN & GILBERT, Synopsis, 861, 1883.

Spheroides testudineus, JORDAN & EDWARDS, *l. c.*, 239; JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 130.

2151. SPHEROIDES ANNULATUS* (Jenyns).

Head 3; depth 4; eye small, 4 to 5 in head. D. 8; A. 7; interorbital space very broad, nearly flat, its width 3¼ in head, 1¼ in snout, which is 1¾ in head. Body robust, moderately inflatable; the head broad and short; snout short, steep, and nearly straight in profile; caudal subtruncate, 1⅔ in head; dorsal rather high; pectoral broad, truncate, the lower angle rounded, upper parts from nostrils to dorsal covered with small, sharp prickles, closely set; a few prickles on lower part of cheek and on front of belly; most of belly smooth with longitudinal wrinkles, the spines embedded in the thick skin; whole body sometimes entirely smooth (*politus*). Caudal peduncle smooth; upper parts everywhere with small, round, blackish spots, much smaller than pupil, these most conspicuous on sides of body and on sides of head; back dark brown with concentric pale rings and curved streaks or sutures; a V-shaped mark before dorsal, an ellipse surrounding it extending just before dorsal and behind nape; 2 dark, oblique bars on caudal peduncle, with 3 corresponding oblique streaks on head, these markings less distinct in old examples, the dark spots becoming more marked as the pale streaks fade away; caudal nearly plain, dusky behind. Length 18 inches. Pacific coast of tropical America; generally common in sandy bays from Cerros Island to Ecuador; once recorded from San Diego; representing the very closely allied *Spheroides testudineus* of the Atlantic. Here described from specimens from the Galapagos, typical of *annulatus*. It is possible that the species is not really distinct from *Spheroides testudineus*, but the snout seems a little shorter than in the latter, the head broader and the pale markings more definitely resembling concentric ellipses. (*annulatus*, ringed.)

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* Concerning this species Dr. Gilbert remarks:

"*Spheroides annulatus* is very close to *Spheroides testudineus* of the tropical Atlantic, differing probably in the somewhat longer snout, the smaller size of the black spots on back and sides, and the weaker development of the spines, which rarely protrude in adults. The only differences which have been alleged to separate *politus* from *annulatus* (*heraldi*) is the greater development of spines in the latter, *politus* being described as perfectly smooth. The young, however, usually have evident spines; the pits which contain the spines can always be made out in adults, and the spines occasionally protrude, and are evident in specimens differing in no other respects from others which are perfectly smooth. This is due in part to varying developments of the spines, but is largely attributable to differences in state of preservation and degree of inflation. Young specimens seem always to show the concentric light rings in front of the dorsal fin, and the light cross bars on head and nape, the latter extending downward and backward on sides. The smallest ring is usually connected with the one surrounding it by a median line running forward, and by a cross streak on each side. The dark areas are sometimes solid and uniform, more frequently covered with small, round, black spots, and sometimes divided by reticulating light-blue lines into small polygonal blotches. The lower part of the sides is marked with large black spots. Larger specimens often have this pattern of coloration indistinct, adults showing back and sides almost uniformly covered with small black spots."

Among our many specimens from Mazatlan we find all ranges of variations, from those wholly without spines to those prickly above and below, both kinds being taken in the same haul of the net.

Tetrodon annulatus, JENYNS, Zool. Beagle, 153, 1842, Chatham Island, Galapagos Archipelago (Coll. Chas. Darwin); STEINDACHNER, Ichth. Beitr., V, 23, 1874.

Anchisomus geometricus (KAUP) RICHARDSON, Voyage Herald, 156, pl. 30, 1854, Galapagos Islands; not of BLOCH & SCHNEIDER.

Tetrodon heraldi, GÜNTHER, Cat. Fish., VIII, 283, 1870, Galapagos Islands and Panama; after RICHARDSON'S specimen, prickly and with the interorbital space broad and flat.

Tetrodon geometricus, GÜNTHER, Fish. Centr. Amer., 489, 1869.

Sphæroides testudineus annulatus, JORDAN & EDWARDS, *l. c.*, 240.

Represented northward (Guaymas, Mazatlan, La Paz, etc.) by

2151a. SPHEROIDES ANNULATUS POLITUS (Girard).

This form differs usually in having the small dark spots smaller, more numerous, and more unequal in size than is usually the case in *Spheroides annulatus* of the same size. It is also more frequently devoid of prickles, but this character seems to be subject to great variation. At Mazatlan smooth and prickly specimens abound in the Astillero, and may be taken together in the same drawing of the net. Professors Evermann and Jenkins further note that the interorbital space is flat in *S. politus* and concave in *S. annulatus*, but we are unable to appreciate any such difference in the comparison of *politus* from Mazatlan with *annulatus* from the Galapagos. The difference in the size of the spots is, however, tangible and apparently fairly constant. (*politus*, polished.)

Tetrodon politus, GIRARD, Pacific R. R. Survey, X, 340, 1858, San Diego, California, specimens perfectly smooth; GÜNTHER, Fish. Centr. Amer., 489, 1869; GÜNTHER, Cat., VIII, 281, 1870; JORDAN & GILBERT, Synopsis, 860, 1883.

Sphæroides politus, JORDAN & EDWARDS, *l. c.*, 239; EVERMANN & JENKINS, Proc. U. S. Nat. Mus. 1891, 165.

2152. SPHEROIDES FORMOSUS (Günther).

Head 3; depth 2½ to 3; snout 2⅗ in head; eye 5 to 5½. D. 7; A. 7. Body short and stout, the head short and very broad, the snout short, slightly convex, and not very steep; interorbital space very broad, flat, with a median bluntish ridge, its width 1⅙ in snout, 2⅗ in head; no cirri; nostrils in a very short, thick tube, with very large, slit-like openings extending to base of tube; outer opening wholly lateral, but the inner encroaches largely on the anterior face of the tube; back, from nostrils to dorsal, with rather small, sharp prickles, close set anteriorly, sparse posteriorly; belly, from throat to vent, everywhere with small prickles; head, sides, and caudal peduncle with smooth skin; fins rather small; caudal truncate, 1¾ in head; pectoral obliquely rounded. Color* grayish; back and sides closely covered with sharply defined, roundish or oblong, blackish spots, varying from size of pupil upward, some of them quite small, those on back confluent into curved concentric or transverse streaks, surrounding median pale areas; 5 to 10 close-set, transverse, dark streaks on top of head and front of back, the markings varying considerably in different specimens, but always sharply defined, and forming spots and concentric bars and ellipsoids. Panama. Here described from numerous specimens obtained by the *Albatross*, the longest about 10 inches long. This species seems allied to *Spheroides bajacu* (Castelnau), from Bahia, and is very distinct from *Spheroides annulatus*. (*formosus*, comely.)

Tetrodon formosus, GÜNTHER, Cat., VIII, 283, 1870, South America. (Coll. Cuming.)

2153. SPHEROIDES FURTHI (Steindachner).

Head 2⅗. D. 8; A. 7; eye 4 in head, about equal to the interorbital width, which is 3⅔ to 4⅖ in head; snout short, profile of snout rather steep, its length 2½ to 2¾ in head. Numerous fine sharp spines on upper parts of body from eyes to base of dorsal fin, and below from throat to vent; a slight fold along each side of tail; caudal fin weakly concave. Brownish above, with small irregular bluish-gray spots; sometimes 3 faint blackish cross bands, the foremost on the forehead, the others on the back before the dorsal; a dark band on base of pectoral; fins yellowish. (Steindachner.) Panama; rather scarce. Length 3½ inches. (Named for Ignatius Fürth.)

Tetrodon furthi, STEINDACHNER, Ichth. Beiträge, V, 22, 1874, Panama (Coll. Fürth); JORDAN, Proc. U. S. Nat. Mus. 1885, 393.
Sphæroides furthi, JORDAN & EDWARDS, *l. c.*, 236.

2154. SPHEROIDES TRICHOCEPHALUS (Cope).

Head 3½ in total length; eye 3½ in head; interobital width 1¼ in eye. D. 8; A. 7. Profile suddenly descending from prefrontal region to premaxillary, arched from the former point backward; belly spinous to near vent; dorsal region from a little behind the nares to above the ends of the pectoral fins spinous; spines on the head long, close set, like seal bristles; caudal fin truncate, with prominent angles. Brownish above, faintly vermiculated with lighter; sides yellowish, becoming white below; fins uniform light yellow; a brown spot at base of pectoral. (Cope.) Gulf Stream. Known only from Cope's description of a small specimen 4 inches long taken in the Gulf Stream off Newport. Possibly the young of *Spheroides pachygaster*. (*θρίξ*, hair; *κεφαλή*, head.)

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* The coloration of *Spheroides formosus* is more striking than in *testudineus* or *annulatus*. Belly pure white; back black, crossed with narrower light lines. The latter have a transverse direction on head and nape, where they form 7 or 8 cross bars, and show a more or less evident tendency to form concentric rings on back. Each nostril in a black spot surrounded by a white ring. The light bars are much narrower and more numerous than in *testudineus*, and are frequently connected by cross branches, thus dividing up the dark background into disconnected series of large black spots. Anal largely blackish, the other fins light, unmarked.

Tetrodon trichocephalus, COPE, Proc. Ac. Nat. Sci. Phila. 1870, 120, Gulf Stream off Newport, Rhode Island; JORDAN & GILBERT, Synopsis, 862, 1883.
Sphæroides trichocephalus, JORDAN & EDWARDS, *l. c.*, 236.

2155. SPHEROIDES PACHYGASTER (Müller & Troschel).

Dorsal rays 10; interorbital width twice diameter of eye, or equal to length of snout; nostrils nearer eye than to tip of snout, papillary, with 2 openings. Dorsal fin in front of anal; caudal truncate, upper and lower points somewhat elongated. Body smooth all over in adult (probably prickly when young). Color bright brown with darker spots on the back. (Günther.) Length 14 inches. "A very scarce species around the Barbados." (Günther.) Not seen by recent collectors; possibly the type of a distinct subgenus. (*παχύς*, thick; *γαστήρ*, belly.)

Tetrodon (Cheilichthys) pachygaster, MÜLLER & TROSCHEL in Schomburgk, Hist. Barbados, 677, 1840, Barbados.
Tetrodon pachygaster, GÜNTHER, Cat., VIII, 287, 1870.
Sphæroides pachygaster, JORDAN & EDWARDS, *l. c.*, 235.

679. OVOIDES, Lacépède.

Les Ovoides, LACÉPÈDE, Hist. Nat. Poiss., I, 256, 1797 (*fascé;* French names only); based on front view of *Tetraodon stellatus*.
Ovum, BLOCH & SCHNEIDER, Syst. Ichth., 530, 1801 (*commersoni*); after LACÉPÈDE; name preoccupied in mollusks.
Ovoides, DUMÉRIL, Zoologie Analytique, 1806; after LACÉPÈDE.
Oonidus, RAFINESQUE, Analyse de la Nature 1815, 90 (substitute for *Ovum*).
Arothron, MÜLLER, Abh. Berl. Akad. 1839, 252 (*testudinarius*=*reticularis*).
Les Dilobomyctères (*Dilobomycter*), BIBRON, Revue Zool. 1855, 279 (*reticularis*, etc.).
? Les Dichotomyctères (*Dichotomycter*), BIBRON, Rev. Zool. 1855, 279 (*fluviatilis;* no diagnosis).

Body rather robust, the skin usually more or less prickly. Nostril on each side with a tentacle, bifid to the base, its tips without opening, the branches of the large olfactory nerve ending in cup-like depressions along the inner edges of the two flattish lobes. Dorsal and anal fins short, rounded, each of 7 or 8 rays; caudal rounded. Vertebræ usually 8 and 10. A ring muscle about the eye forming eyelids. Postfrontals and prefrontals deflected, to describe the segment of the circle. Species numerous, chiefly of the tropical Pacific; distinguished from *Spheroides* by the solid nasal tentacles, and from the still more closely related African genus *Tetraodon* (*Tetraodon lineatus, L.*) by the form of its frontals, the two genera being similar in external characters. (*ovum*, egg; *εἶδος*, resemblance.)

a. Interorbital space concave, its width nearly twice eye; spines on body coarse; color dark, the back with round pale spots; several parallel longitudinal streaks below pectorals. ERETHIZON, 2156.

aa. Interorbital space flattish, its width 1½ times eye; spines slender; color yellow, blue, or brown; back and belly with or without round pale spots; no distinct dark streaks below pectorals. SETOSUS, 2157.

2156. OVOIDES ERETHIZON (Jordan & Gilbert).

D. 9; A. 10. Entire body, except snout and caudal peduncle, thickly beset with long, robust, quill-like spines, which are longest and most numerous on belly, these spines sometimes apparently wanting, being buried in the skin. Snout short, cuboid; interorbital space wide, concave, its width greater than length of snout, and nearly twice diameter of eye; nasal tentacle bifid to the base, the inner surface of each division thickly covered with minute, cup-shaped depressions, the openings of the nostrils; length of tentacle ½ its distance from eye, or ¼ diameter of eye. Color dark brown, everywhere above with round whitish spots, most numerous on caudal peduncle, the largest ½ diameter of pupil; a dark area around base of pectoral, bounded by a white line; several parallel longitudinal black streaks below the pectorals. Size large; length about a foot. Panama and neighboring islands, apparently rare. (*erethizon*, the porcupine, from ἐρεθίζω, to irritate.)

Arothron erethizon, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 631, Panama (Type, No. 29679. Coll. Frank H. Bradley); JORDAN, Proc. U. S. Nat. Mus. 1885, 393.
Tetraodon erethizon, JORDAN & EDWARDS, *l. c.*, 244.

2157. OVOIDES SETOSUS (Rosa Smith).

Head 4; eye 4 in head; snout 3; interorbital space moderate, nearly flat, 1½ times width of orbit; upper profile of snout abruptly concave at tip. Body everywhere thickly beset with short, slender, stiff spines except around mouth, vent, and bases of fins; spinules nearly uniform, some rootless, others with 2 to 5 roots, about 70 in a row from eye to dorsal. Nostrils each with a tentacle, bifid to the base, the lobes flattish and without distinct opening. Caudal subtruncate, ½ longer than peduncle; dorsal and anal rounded. Coloration extremely variable; the type specimen, as described by Mrs. Eigenmann, dark brown, everywhere with roundish white spots, as large as pupil or larger; these spots larger below, coalescing on ventral surface, forming vermicular markings; spots on belly broader than spaces of ground color, on back narrower; fins with similar but smaller spots; no streaks or black marks anywhere; pectorals and dorsal white-edged; anal with a pale marginal streak; most of those seen in collections agree with this type. Our many specimens collected by the *Albatross* at Clarion Island are, however, of various shades of color, ranging from deep blue to lemon yellow, and with the spots equally variable; some specimens are deep blue, unspotted, some yellow with dark mottlings or blotches, some blackish with pale bluish or white spots, close set and profuse; still others are black with the white in the form of vermiculations and angular streaks. One specimen is pure yellowish white, with a black bar across the pectoral only. The causes of these excessive variations are unknown. In all, the prickles are slender and very numerous. West coast of Mexico, abundant about the Revillagigedo Islands and on rocky shores in the Gulf of California, dried specimens being often sold at La Paz, and even in San Francisco. Length 14 inches. Very close to the East Indian species *Ovoides meleagris* (Lacépède.) (*setosus*, bristly.)

Tetraodon setosus, ROSA SMITH (now Mrs. EIGENMANN), Bull. Cal. Ac. Sci., II, 6, Nov. 13, 1886, Mexico. (Type, a dried skin, No. 2996, Mus. Cal. Ac. Sci.)

680. COLOMESUS, Gill.

Les Batrachopes, BIBRON, Revue Zoologique 1885, 279 (*psittacus*).
Batrachops, HOLLARD, Études sur les Gymnodontes, 321, 1857 (*psittacus*), name preoccupied.
Colomesus, GILL, Proc. U. S. Nat. Mus. 1884, 422 (*psittacus*).

This genus is externally similar to *Spheroides*, but differs strikingly in the structure of the skull, the frontal bones being narrowed and excluded from the orbit, the postfrontals being elongated, projected forward and connected with the prefrontals; snout very obtuse; dorsal and anal short, rounded. Nostrils as in *Spheroides*, on each side a hollow papilla with 2 openings. Vertebræ 8 + 11. One species; South American. (*κολός*, defective; *μεσός*, middle; from the narrowed frontals excluded from the orbits.)

2158. COLOMESUS PSITTACUS (Bloch & Schneider).

D. 11; A. 9. Body short and thick, covered with small, 2-rooted spines, except on snout, around pectoral fin, and on caudal peduncle; some spines behind dorsal in adult; spines on sides with their points directed toward the back. Snout very obtuse, slightly concave behind lip, its length less than interorbital width. Eye rather large, not ⅓ interorbital width, much nearer tip of snout than gill opening. Pectoral and caudal truncate, other fins rounded. Brownish, with 6 dark cross bands on back, the 2 bands between dorsal and pectoral sometimes confluent, the band behind pectoral and that at base of caudal most distinct; pectoral dusky at base; no distinct spots anywhere. River mouths, Guiana and northern Brazil, rather common; not known to descend to the sea. Recorded from the Rio Blanco, Essequibo, Marañon, and Capin at Pará; also from the West Indies. (*ψιττακος*, parrot, from the form of the beak.)

Ostracion tetraodon, SEBA, Thesaurus, etc. (pre-Linnæan).
Tetrodon psittacus, BLOCH & SCHNEIDER, Syst. Ichth., 505, 1801, Malabar; GÜNTHER, Cat., VIII, 286, 1870.
Cheilichthys asellus, MÜLLER & TROSCHEL in Schomburgk, British Guiana, III, 641, 1842, Guiana.
Cheilichthys psittacus, STEINDACHNER, Ich. Mittheil, II, 1861, 141, pl. 4, fig. 2.

Family CLXXIII. CANTHIGASTERIDÆ.

(THE SHARP-NOSED PUFFERS.)

This family includes small Puffers, similar in external appearance to the *Tetraodontidæ*, but with the snout sharp and the back more or less compressed or ridge-like. The skeletal characters by which the group is defined are thus given by Dr. Gill: Medifrontals separated from the supraoccipital by the intervention of the sphenotics which are connected together and laterally expanded, but short; the prosethmoid prominent above, enlarged and narrowed forward. Vertebræ about 8 + 10. Head compressed, with a projecting, attenuated snout; dorsal and anal short, few-rayed. Nostrils obsolete, imperforate. One genus, with 15 species, found in the tropical seas; none of them reaching a length of more than 5 inches.

681. CANTHIGASTER, Swainson.

Canthigaster, SWAINSON, Nat. Hist. Fishes, II, 194, 1839 (diagnosis only; no species mentioned; *rostratus* intended).
Psilonotus, SWAINSON, Nat. Hist. Fishes, II, 328, 1839 (*rostratus*); substitute for *Canthigaster;* not *Psilonotus*, a genus of *Hymenoptera* of prior date.
*Prilonotus** (KAUP MS.) RICHARDSON, Voyage Herald, 162, 1854 (*rostratus*).
Tropidichthys, BLEEKER, Nat. Tyds. Nederl. Ind., IV, 1854 (*valentini*).
Anosmius, PETERS, Wiegmann's Arch. 1855, 274 (*tæniatus*).
Rhynchotus (BIBRON) HOLLARD, Études Gymnodontes, 320, 1857 (*peroni*).

Characters of the genus included above. (*ἀ'κάνθα*, spine; *γαστήρ*, belly; Swainson here as elsewhere takes *κανθα* to mean spine, a usage without classical warrant.)

- *a.* No black ocellus below the dorsal.
  - *b.* Upper parts everywhere behind head covered with round pale spots; fins all pale; dorsal rays 9. PUNCTATISSIMUS, 2159.
  - *bb.* Upper parts dark brown without whitish spots; caudal always marked with black; dorsal rays 6. ROSTRATUS, 2160.

2159. CANTHIGASTER PUNCTATISSIMUS (Günther).

D. 9. Snout produced, its upper profile slightly concave; spines on belly and front of back. Upper parts everywhere behind head covered with round whitish spots, not larger than pupil, and separated from each other only by a network of the brown ground color; fins all unmarked, pale. Length 3 inches. Pacific coast of America, Gulf of California to Panama; not common. (*punctatissimus*, very much dotted.)

Tetrodon punctatissimus, GÜNTHER, Cat., VIII, 302, 1870, Panama. (Coll. Capt. Dow.)
Tetrodon oxyrhynchus, LOCKINGTON, Proc. Ac. Nat. Sci. Phila. 1881, 116, Gulf of California.
Psilonotus punctatissimus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 370.
Canthigaster punctatissimus, JORDAN & EDWARDS, *l. c.*, 246.

2160. CANTHIGASTER ROSTRATUS (Bloch).

D. 6. Snout moderately produced, rather more than twice the concave interorbital space; caudal slightly lunate. Body smooth, except abdomen, which is covered with very small, 2-rooted spines. Upper parts dark brown, without white spots; upper and lower margins of caudal fin abruptly black, the middle of the fin pale, immaculate; an irregular brownish band or series of dots from pectoral to upper margin of caudal, continuous with the dark band on the latter; lower band of caudal continued on side of tail; adults (according to Poey) with chestnut-colored bands on caudal peduncle and on chin; dark streaks about eye. A young specimen before us, 2 inches in length, from the Snapper Banks off Pensacola, does not show these bars. Upper and lower edges of caudal abruptly jet-black, this color extending as a dark stripe along the median line of caudal peduncle above and below. No cross bands on tail. Belly with conspicuous 2-rooted prickles; some prickles and granulations on the back. West Indies, north, in rather deep water, to the banks off Pensacola; also found in the Madeiras and Bermudas. (*rostratus*, long-snouted.)

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* *Prilonotus* is "a name invented by Müller, and is mentioned by him in his Fortsetzung der Myxinoiden and in Archiv fur Naturgeschichte für 1841." (Richardson.)

Tetrodon rostratus, BLOCH, Ichthyologia, I, pl. 146, 1782, India; GÜNTHER, Cat., VIII, 303, 1870; GOODE, Am. Jour. Sci. Arts 1877, 290; GÜNTHER, Shore Fishes, Challenger, 9, 1880.

Tetrodon capistratus, LOWE, Proc. Zool. Soc. London 1839, 90, Madeira.

Prilonotus (Anchisomus) caudicinctus, RICHARDSON, Voyage Herald, 162, pl. 30, figs. 1–3, 1854, locality unknown.

Tetradon ornatus, POEY, Synopsis, 433, 1868, Havana; GÜNTHER, Cat., VIII, 303, 1870.

Tetrodon caudicinctus, GÜNTHER, Cat., VIII, 303, 1870; POEY, Enumeratio, 73, 1875.

Canthigaster caudicinctus, COPE, Trans. Am. Philos. Soc. 1871, 479.

Canthigaster rostratus, JORDAN & EDWARDS, *l. c.*, 246.

Family CLXXIV. DIODONTIDÆ.*

(THE PORCUPINE FISHES.)

Body short, broad, depressed above. Belly moderately inflatable, covered everywhere except on the lips and caudal peduncle with spines, which are usually 2-rooted or 3-rooted at their bony base. Caudal peduncle short and slender. Mouth moderate, terminal, each jaw covered with a bony plate like the beak of a bird, these not divided by a median suture. Nostrils on each side forming a small tentacle, usually with 2 openings. Eye rather large, gill opening moderate, immediately in front of the pectoral, which is short, broad, and rounded. Dorsal and anal fins short, similar to each other, rounded in form and placed posteriorly. Genera about 6; species 15. Sluggish fishes, living on the bottom among weeds and corals, in tropical seas. When disturbed, they swallow air and float belly upward on the water. Their capacity of inflation is very much less than that of the *Tetraodontidæ*, from which family they differ chiefly in the stronger armature and in having no division in the bony plate of either jaw. They are rarely used as food, being generally regarded as poisonous. The species are mostly well known in collections, the singular form having attracted the attention of travelers in the earliest times. (*Tetrodontidæ*, part, Günther, Cat., VIII, 306–316, 1870.)

a. Dermal ossifications very small, each one 2-rooted, with a fine flexible spine or hair like bristle. Nasal tentacles present. TRICHODIODON, 682.

aa. Dermal ossifications mostly 2-rooted; the spines rather slender, but stiff and erectile. Nasal tentacle simple, with 2 lateral openings. DIODON, 683.

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* See Eigenmann's Review of the Genera and Species of *Diodontidæ* found in American seas, Annals N. Y. Ac. Sci. 1885, 297.

aaa. Dermal ossifications all or nearly all 3-rooted, each with a short, stiff, immovable spine. Nasal tentacle simple, with 2 openings. CHILOMYCTERUS, 684.

aaaa. Dermal ossifications of flattish, papery or cartilaginous plates with minute hair-like papillæ; nostril short, entire, with 2 lateral openings. LYOSPHÆRA, 685.

682. TRICHODIODON, Bleeker.

Trichodiodon, BLEEKER, Atlas Ichth., Gymnodontes, 49, 1867 (*pilosus*).
? *Trichocyclus*, GÜNTHER, Cat., VIII, 316, 1870 (*erinaceus* = *pilosus*).

Body oblong, little depressed; nasal tentacle present; dermal ossifications very small, each with a pair of lateral roots, and each terminating in a fine, flexible, bristle-like spine; fins as in *Diodon*, of which the species are possibly the very young. (*θρίξ*, hair; *Diodon*.)

2161. TRICHODIODON PILOSUS (Mitchill).

This species, which may be simply the very young of *Diodon hystrix*, is known only from accounts given by Mitchill, Cuvier, and Günther. It is possible that these 3 descriptions refer to 3 different species, but more likely all of them are based on young Diodons. Mitchill says: "Hairy Diodon (*Diodon pilosus*). With a covering of bristly hair. Length about an inch and a half; breadth less than half an inch; depth nearly a quarter; making a blunt lump of a fish. Is covered all over—back, sides, head, and belly—with bristly hair. The bristles strong and flexible, without the power to scratch or to prick. Hair about an eighth of an inch in length. Complexion dun or brown, with spots on the back, sides, and toward the belly. Has, at first glimpse, the appearance of a young mouse. Mouth small, midway, and horizontal. Eyes vertical, lateral, and large. No ventral fins. Pectorals broad. Dorsal and anal very far back, and no hair between them and the tail. This is but a small projection from the thick and clumsy body, and is terminated by a fin of 7 rays. Dorsal, anal, and pectoral fins contain each about 13 rays."

Cuvier, referring to Mitchill's description, says: "We possess in the museum a large individual, more than 2½ feet long, entirely covered and roughened by slender spines like the points of pins, 1 line of spines prominent nearly on the back and on the sides, and 2 or 3 under the belly. The region of the mouth, that of the eyes, the base of each fin, and the end of the tail alone are deprived of spines. The color of the skin is gray, with round brown points scattered all over it 4 or 5 lines broad. Similar spots are scattered on the fins, which seem to have been yellowish in color. While waiting to know if this *Diodon* is not the adult of that which Mr. Mitchill has described, I will name it *Diodon asper*."

Under the name of *Trichocyclus erinaceus* Günther describes a very young example, apparently of this same type, as follows: "Jaws without median suture. Body covered with very small dermal ossifications, each with a pair of lateral roots, and a fine, flexible spine. A nasal tentacle. Dorsal and anal fins as in the allied genera. The spines are hair-like, ⅛ of an inch long in an example 1½ inches long." Locality unknown.

De Kay, in the Fauna of New York, page 326, has the following description of *Diodon pilosus*, from a specimen 2 inches long, accompanied by a figure which evidently represents the young of *Diodon hystrix:* "Body oblong, cuboidal. Every part of the surface except a small space round the mouth and eyes, and another including the base of the caudal fin, furnished with bristles; these are from $\frac{2}{10}$ to $\frac{4}{10}$ long, directed backward, though probably capable of erection at the will of the animal. They are somewhat longer and more crowded on the dorsal and posterior parts of the body; they are all soft and flexible, suggesting the idea of hair-like processes. Eyes large and lateral; the space between the orbital margins depressed, concave. Nostrils single, with an obliquely truncated tubular orifice. Mouth terminal, broad, with thin membranaceous lips. Jaws, or rather the teeth, ending in an acute tip in front. Branchial orifice ear-shaped, placed in front of the upper part of the base of the pectorals. The dorsal slightly anterior to but over the anal, rounded on its margin, higher than wide; pectoral short and broad, its upper rays longest; anal fin broad, and similar in shape to the dorsal; caudal lanceolate. Brownish above; ashy white beneath; the prickles of a metallic golden color; on the back and along the sides several oblong, distant, blackish-brown spots. Length 2 inches. Fin rays, D. 12; P. 20; A. 14; C. 9. This remarkable little species, which has been occasionally taken in the bay of New York, was first described by Mitchill. It was subsequently referred by Cuvier (Op. sup. cit.) as the young of a species which he names *asper*, 2½ feet long. It is probable that his opinion underwent some modification subsequent to the publication of that paper; for in the last edition of his Règne Animal *D. pilosus* is cited as a distinct species."

While we may infer that the specimens of Mitchill and De Kay were both supposed to come from New York Harbor, it is not likely that *Diodon hystrix* was ever found in this locality, and it is probable that the specimens called "*pilosus*" came from some warmer region. We have never seen any species referable to the genus *Trichodiodon*, and doubt the existence of *Trichodiodon pilosus* as a distinct genus or species. (*pilosus*, hairy.)

Diodon pilosus, Mitchill, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 471; supposed to be from New York Harbor; specimen 1½ inches long.

Diodon asper, Cuvier, Mém. du Museum, IV, 1818, no locality; specimens 2½ feet long.

? *Trichocyclus erinaceus*, Günther, Cat., VII, 316, 1870, no locality; specimen ⅞ inch long.

Trichodiodon pilosus, Günther, Cat., VIII, 316, 1870; Jordan & Gilbert, Synopsis, 862.

683. DIODON, Linnæus.

(Porcupine Fishes.)

Diodon, Linnæus, Syst. Nat., Ed. X, 335, 1758 (*hystrix*).

Paradiodon, Bleeker, Atlas Ichth., Gymnodonts, 56, 1867 (*hystrix*); name a substitute for *Diodon*, transferred to another genus; the first species mentioned by Linnæus being *Diodon atinga*, which was therefore taken by Bleeker as the type.

? *Trichodiodon*, Bleeker, Atlas Ichth., Gymn., 49, 1867 (*pilosus*; larva?).

? *Trichocyclus*, Günther, Cat., VIII, 316, 1870 (*erinaceus*; larva?).

Body robust, the belly moderately inflatable. Dermal spines strong, stiff, most of them 2-rooted and erectile, a few 3-rooted and therefore immovable; both jaws entire; nasal tube simple, with 2 lateral openings. Pectorals broad, their margin undulate, the upper lobe longest; vertical fins rounded, the dorsal and anal short, posteriorly inserted, similar to each other. Tropical seas; the few species very widely distributed. (*δίς*, two; *ὀδούς*, tooth.)

a. Spines terete.
  b. Frontal spines not as long as post-pectoral spines (in adults not ½ as long, about as long as eye); predorsal spines very short, 3-rooted, fixed or nearly so; 20 spines in a series between snout and dorsal; post-pectoral spines very much elongate, especially in the adult, shorter in the young; dorsal rays 15; anal 15; upper lobe of pectoral little longer than lower. Adult above everywhere covered with round black spots, these largest in front of dorsal, smallest on naked area about mouth; white below; fins profusely spotted with black; young with fewer spots, but never with large blotches. HYSTRIX, 2162.
  bb. Frontal spines long, usually longer than post-pectoral spines, about twice as long as eye in adult; predorsal spines not shortened, 2-rooted, erectile; 14 to 17 spines in a series between snout and dorsal; post-pectoral spines not especially elongate, their development variable; dorsal rays usually 12; anal 12; pectoral broader than long, its upper lobe pointed, lower lobe rounded. Body marked with black spots and blotches irregular in size, usually a broad black bar from eye to eye, continued below eye as a narrow bar; a broad bar across occiput; a black blotch above each pectoral; a short bar in front of dorsal; another in which the dorsal is inserted; a blotch behind pectoral, and many small spots and blotches on upper parts; fins with few spots, usually unmarked in the young. HOLACANTHUS, 2163.
aa. "Spines compressed laterally, short; 15 spines in a series between snout and dorsal; upper parts covered with round spots, those about pectorals sometimes confluent into a blotch; fins immaculate." MACULIFER, 2164.

2162. DIODON HYSTRIX, Linnæus.

(PORCUPINE-FISH; ERIZO; PUERCO ESPINO.)

Head 3; depth 3½. D. 13 to 15; A. 13 to 15. Spines strong, dilated at base, with a pair of basal grooves; frontal spines not as long as post-pectoral spines (in adults not ½ as long, about as long as eye); post-pectoral spines longer than any others, especially in the adult, usually about as long as pectoral fin, those of the posterior part of back and tail short and broad, 3-rooted, and therefore not erectile; predorsal spines very short, 3-rooted, fixed or nearly so; about 20 spines in a series between snout and dorsal; upper lobe of pectoral little longer than lower; upper and lower part of tail with 2 or 3 pairs of 3-rooted, immovable, recumbent spines. Adult above everywhere covered with small round black spots, these largest in front of dorsal, smallest on naked area about mouth; white below; fins all more or less spotted in the adult, nearly plain in the young. Length about 3 feet. Tropical seas; everywhere common; north to Lower California, Florida, and the Hawaiian Islands; abundant in collections, being stuffed and dried as a curiosity; not used as food. (*hystrix*, the porcupine.)

Orbis echinatus, RONDELET, De Piscibus, 324, 1558, Northern Ocean.
Guamajacu guara, MARCGRAVE, Hist. Nat. Bras., 159. 1648, Brazil.
Ostracion conico oblongus, ARTEDI, Genera, 60, No. 19, 1738.

Erizo, Parra, Desc. Dif. Piezas Hist. Nat. Cuba, 60, pl. 29, fig. 1, 1787, Havana.

Diodon hystrix, Linnæus, Syst. Nat., Ed. x, 335, 1758, India; after Artedi; Günther, Cat., viii, 306, 1870; Jordan & Gilbert, Synopsis, 863, 1883; Jordan & Rutter, Proc. Ac. Nat. Sci. Phila. 1897, 130; and of writers generally.

Diodon atinga, Bloch, Ichth., iv, 75, pl. 125, 1787; not of Linnæus.

Le Diodon (Plumier) Lacépède, Hist. Nat. Poiss., ii, 1 and 10, pl. 3, fig. 3, 1798, Martinique; on a drawing by Plumier.

Diodon brachiatus, Bloch & Schneider, Syst. Ichth., 513, 1801, Cuba; after Parra, pl. 29, fig. 1.

Diodon punctatus, Cuvier, Mém. Mus. Hist. Nat., iv, 132, 1818, no locality.

Diodon echinus (Rafinesque) Bonaparte, Cat. Met. Pisc. Eur., 87, 1846, Mediterranean Sea; accidental.

?*Diodon spinosissimus*, Günther, Cat., viii, 307, 1870.

2163. DIODON HOLACANTHUS, Linnæus.

D. 12; A. 12. Very similar to *Diodon hystrix*, but with the frontal spines usually longer than the spines behind the pectorals, about twice as long as eye. Predorsal spines not shortened, 2-rooted, erectile; about 14 to 17 spines in a series between snout and dorsal; post-pectoral spines not especially elongate, but movable; pectoral broader than long, upper lobe pointed, lower lobe rounded. Coloration much as in *Diodon hystrix*, but more variable, the spots fewer and larger; usually a broad black bar from eye to eye, continued below eye as a narrow bar; a broad bar across occiput; a black blotch above each pectoral; a short bar in front of dorsal; another in which the dorsal is inserted; a blotch behind the pectoral, and many small spots and blotches on the upper parts; fins with few spots, mostly immaculate in the young. In all warm seas, north to the Florida Keys, Lower California, and the Hawaiian Islands, its range coinciding with that of *Diodon hystrix*, from which it may prove to be not distinct. An example before us is from La Paz. The distinctions are generally evident in the adult, but young specimens apparently intermediate are often found. Possibly the two are different sexes of the same species. Length 1 to 2 feet. None seen by us of as large size as the largest *hystrix*. (*ὁλός*, wholly; *ἄκανθα*, spine.)

Ostracion oblongus holacanthus, Artedi, Genera, 60, No. 20, 1738.

Crayracion, Nos. 9 and 15, Klein, Historia Pisc., 19 and 20, pl. 3, fig. 6, 1740.

Diodon holocanthus, Linnæus, Syst. Nat., Ed. x, 335, 1758, India; based on Artedi; misprint for *holacanthus*.

Erizo Guanabana, Parra, Desc. Dif. Piezas Hist. Nat. Cuba, 62, pl. 29, fig. 2, 1787, Havana.

Le Diodon tachetc, Lacépède, Hist. Nat. Poiss., ii, 13, 1798, New Cytherea.

Diodon liturosus, Shaw, Gen. Zoöl., v, pl. 2, 436, 1804; after *Diodon tacheté*, Lacépède.

Diodon spinosissimus, Cuvier, Mém. Mus., iv, 134, 1818; no locality.

Diodon novemmaculatus, Cuvier, Mém. Mus. Hist. Nat., iv, 136, pl. 6, 1818, no locality.

Diodon sexmaculatus, Cuvier, Mém. Mus. Hist. Nat., iv, 136, pl. 7, 1818, no locality; Günther, Fish. Centr. Am., 396, 1869.

Diodon multimaculatus, Cuvier, Mém. Mus. Hist. Nat., iv, 136, 1818, no locality.

Diodon quadrimaculatus, Cuvier, Mém. Mus. Hist. Nat., iv, 137, pl. 6, 1818, Otaiti.

Diodon melanopsis, Kaup, Wiegmann's Archiv 1855, 228.

Paradiodon quadrimaculatus, Bleeker, Atl. Ichth., Gymnod., pl. 8, fig. 2, 1865.

Diodon maculatus, var. a, Günther, Cat., viii, 307, 1870; based on *Diodon tacheté* of Lacépède; St. Croix; Jamaica; Panama; South America; Hawaiian Islands; China; Sooloo Sea; Indian Ocean.

Diodon maculatus, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 70 and 453; Jordan, Proc. Ac. Nat. Sci. Phila. 1884, 46.

2164. DIODON MACULIFER, Kaup.

Spines rather short, strong, remarkably flattened, and compressed transversely. Upper part of tail without ossifications, but a pair of spines lying alongside their root on side of dorsal fin; roots of spines strong and long. About 15 transverse series of spines between snout and dorsal fin. Upper part of head and body with round black spots, each of about the size of the pupil of the eye; sometimes the spots above or near the pectoral confluent into a blotch. Fins and abdomen immaculate. Length 10 inches. (Günther.) Cape of Good Hope. A specimen recorded by Günther from Cuba. This is perhaps an error, as neither Poey nor any other American writer has noticed specimens in the West Indies. The species is unknown to us. (*macula*, spot; *fero*, I bear.)

Diodon maculifer, KAUP, Wiegmann's Archiv 1855, 229, Cape of Good Hope; GÜNTHER, Cat., VIII, 309, 1870.

684. CHILOMYCTERUS, Bibron.

(BURR-FISHES.)

Chilomycterus, BIBRON, in Barneville, Revue Zoologique, 40, 1846 (*reticulatus* = *tigrinus*).
Chilomycterus, KAUP, Wiegm. Archiv 1847, 365 (*antennatus*).
Cyclichthys, KAUP, Wiegm. Archiv 1855, 231 (*orbicularis*).
Cyanichthys, KAUP, Wiegm. Archiv 1855, 231 (*cœruleus*).
Diodon, BLEEKER, Atl. Ichth., Gymnod., 55, 1865 (*atinga*), the first species mentioned by Linnæus; not *Diodon*, as earlier restricted by Kaup to *Diodon hystrix*.

Body broad, depressed, moderately inflatable. Dermal spines short, stout, immovable, triangular, each with 3 roots; nasal tube simple, with 2 lateral openings; the tube sometimes rounded, sometimes flattened, and with the partition feeble and easily torn so that the tentacle appears divided; caudal peduncle short; fins small, formed as in *Diodon*; jaws without median suture. Species numerous, of smaller size than those of *Diodon*, the spines broader and lower, their bases forming a coat of mail. (*χεῖλος*, lip; *μυκτήρ*, nose. "Narines non closes au sommet, mais chacune ayant l'apparence de deux lèvres, ou formée de deux tentacules réunis à la base.")

CYCLICHTHYS (*κύκλσς*, round; *ἰχθύς*, fish):

a. Nasal tentacle subcylindrical, not divided.
  b. Fins unspotted; supraorbital spines 2, with generally a tentacle between them; a spine in middle of forehead.
    c. Superciliary edge raised.
      d. Upper parts greenish black, with a series of undulating blackish stripes running from nape backward; a similar series between eyes and across face; an ocellated black spot above pectoral; a larger one behind pectoral; an ocellated spot on each side of dorsal, and an elongated spot behind each of the ventral antennæ. SCHŒPFI, 2165.
      dd. Upper parts plain, without series of lines; spots as in *schœpfi*. SPINOSUS, 2166.
      ddd. Upper parts covered with black, hexagonal reticulations. ANTILLARUM, 2167.
    cc. Superciliary edge not raised; upper parts with numerous black dots, some with bluish centers; a black spot in middle of nape; a large kidney-shaped spot above pectoral, and a subtriangular blotch before and along base of dorsal fin; a series of antennæ along lower part of side. ANTENNATUS, 2168.

CHILOMYCTERUS:

aa. Nasal tentacle flattened, divided; fins spotted with black; supraorbital spines 3, feeble; none on forehead.
- *e.* Supraocular cirrus well developed; upper parts densely covered with small, round, blackish spots; a large black blotch before and around dorsal; another on each side above gill opening and pectoral; spines short, compressed anterior root flat, longer than the others. ATINGA, 2169.
- *ee.* Supraocular cirrus wanting; upper parts with short, dark streaks or bars, becoming blotches on the sides. CALIFORNIENSIS, 2170.

Subgenus CYCLICHTHYS, Kaup.

2165. CHYLOMYCTERUS SCHŒPFI (Walbaum).

(COMMON BURR-FISH; RABBIT-FISH; SWELL-TOAD; SWELLFISH.)

Head 2¾; depth 3. D. 12; A. 10. Body a little broader than deep at gill openings; interocular space broad, concave; eyes large, lateral, nearly as long as snout, each with a cirrus above it, longer than pupil; gill opening about as wide as eye, opposite upper anterior part of pectoral. About 9 spines between eye and tail, their height equaling diameter of pupil; spines on belly much smaller, partly embedded in skin; some of the posterior with cirri; spines on caudal peduncle; anterior root of each spine little if any larger than others. Pectoral fin deeper than long, the margin undulate, the upper lobe longest. Greenish; belly pale; a round, black, ocellated spot above pectorals, not as large as eye, a larger one behind pectorals, another at base of dorsal, with a smaller one below it; back and sides with parallel black stripes of uniform width, about as wide as the interspaces, those on the back running longitudinally, those on sides obliquely downward and backward, those on front of head running crosswise, a dark bar at base of dorsal; belly pale in the adult, often black in the young; other fins plain. Length 6 to 10 inches. Cape Cod to Florida; very abundant southward in shallow water; especially numerous on the coast of the Carolinas and Florida. The body is capable of considerable inflation, but less than is the case with the Tetraodonts. "This species is readily recognized by the dark and light lines of the upper parts. The lines are parallel and meet toward the back. A reticulation is sometimes formed when these lines meet on the anterior part of the back. In the young there seem to be more lines than in the old. Two specimens examined, 3 inches long, have 17 lines between the pectorals; a specimen 5 inches long has 10 lines; and the largest specimen examined, 10 inches long, has 12 lines." (Eigenmann.) (Named for its discoverer, Dr. Johann David Schöpf, noted as a botanical collector.)

The Toadfish, SCHÖPF, "Schriften Berlin Gesellsch. Naturf. Freunde, VII, 192, 1788," Long Island.

Diodon schœpfi, WALBAUM, Artedi Pisc., 601, 1792, Long Island; after SCHÖPF.

? *Diodon meulini*, WALBAUM, Artedi Pisc., 602, 1792, no locality.

Diodon geometricus, var. *lineatus*, BLOCH & SCHNEIDER, Syst. Ichth., 513, 1801, New York; after SCHÖPF.

Diodon maculostriatus, MITCHILL, Fish. N. Y., 470, pl. 56, fig. 3, 1814, New York.

Diodon rivulatus, CUVIER, Mém. Mus. Hist. Nat., IV, 129, pl. 6, 1818, New York; after MITCHILL.

Diodon nigrolineatus, AYRES, Bost. Journ. Nat. Hist., IV, 1842, 68, Brook Haven, Long Island.
Diodon fuliginosus, DE KAY, N. Y. Fauna: Fishes, 324, pl. 55, fig. 181, 1842, New York; young.
Diodon verrucosus, DE KAY, N. Y. Fauna: Fishes, 325, pl. 56, fig. 184, 1842, New York; young.
Chilomycterus geometricus, KAUP, Wiegm. Archiv 1847, var. *a* and *b*; GÜNTHER, Cat., VIII, 310, 1870; GOODE, Proc. U. S. Nat. Mus. 1879, 109; JORDAN & GILBERT, Synopsis, 863, 1883; not *Diodon geometricus*, BLOCH & SCHNEIDER.

2166. CHILOMYCTERUS SPINOSUS (Linnæus).

This species, according to Günther, differs from *Chilomycterus schœpfi* only in the coloration, the dark lines on the back being absent. We have seen no specimens of it and do not know whether it is a distinct species or not. In case the two species are identical the name *spinosus* has priority. West Indies and coast of Brazil; not seen by us. (*spinosus*, spinous.)

Guamaiacu atinga, MARCGRAVE, Hist. Brasil., 168, 1648, Brazil.
Orbis muricatus, Ranæ rictu Guamaiacu Atinga, WILLUGHBY, Historia Piscium, 145, 1686, Brazil; description copied from MARCGRAVE, but with a new figure representing *Chilomycterus schœpfi*.
Atinga alter minor orbicularis, LISTER, Willughby, Hist. Pisc., 155, 1686.
Guamaiacu atinga, MARCGRAVE, Hist. Nat., 168, 1648, "in mari."
Ostracion subrotundus ventre glabro, ARTEDI, Gen. 59, No. 15, 1738.
Diodon spinosus, LINNÆUS, Syst. Nat., Ed. X, 335, 1758, India; based on ARTEDI.
Le Diodon orbe, LACÉPÈDE, Hist. Nat. Poiss., II, 16, 1798, Rio Janeiro.
Diodon geometricus, BLOCH & SCHNEIDER, Ichth., 513, pl. 96, 1801, America.
Cyclichthys cornutus, KAUP, Wiegm. Archiv 1855, 231, Bahia.
Chilomycterus geometricus, var. *y*, GÜNTHER, Cat., 311, 1870; type of *Cyclichthys cornutus*, KAUP.

2167. CHILOMYCTERUS ANTILLARUM, Jordan & Rutter.

Allied to *Chilomycterus schœpfi*, differing in having the whole body covered with black hexagonal reticulations instead of parallel lines. Supraorbital spines 2, 1 frontal spine, a single spine below and in front of eye, 2 between eye and gill opening; interorbital space deeply concave; a transverse series of cirri on chin, and nearly all of the spines along the margin of the belly have cirri, but there is none above the eyes. Spines short and flat. Color in alcohol, above, chestnut brown, paler on sides, yellowish below, the body everywhere covered with reticulating black lines inclosing more or less nearly hexagonal areas somewhat smaller than the pupil; on the belly the lines become heavier, so that Poey's character of "orange spots in a dark background" is not far wrong; an ocellated black spot about the size of the eye above the pectoral, another behind it, and 1 on each side of the dorsal; a black blotch on chin in front of the row of cirri and another at each end. Cuba and Jamaica. Here described from specimens taken at Kingston. (*antillarum*, of the Antilles.)

Chilomycterus fuliginosus au species dubia? POEY, Synopsis Pesc. Cuba, 429, 1868, Havana.
Chilomycterus antillarum, JORDAN & RUTTER, Proc. Ac. Nat. Sci. Phila. 1897, 131, Jamaica. (Type, No. 5056, L. S. Jr. Univ. Mus. Coll. Rev. J. S. Roberts.)

2168. CHILOMYCTERUS ANTENNATUS (Cuvier).

Spines strong, but short; 2 above the orbit, 1 more or less prominent in the middle of the forehead. Superciliary edge not raised; generally a tentacle between the superciliary spines. Tentacles along lower part of side, 1 on each side and in advance of anal fin being especially developed. Tail spineless, but the roots of 1 pair of spines reaching across behind dorsal fin. A black spot in middle of nape; a large kidney-shaped spot above pectoral, and a subtriangular blotch before and along base of dorsal fin; generally a small black spot below eye: some or all of these spots edged with lighter; upper and lateral parts with numerous black dots, some with a bluish pupil; abdomen brown; fins unspotted. Length 8 inches. West Indies and southward; recorded from St. Croix, Jamaica, Porto Rico, and the Cape of Good Hope. Not seen by us. (*antennatus*, having feelers.)

Diodon antennatus, CUVIER, Mém. Mus., IV, 131, pl. 7, 1818.
Chilomycterus puncticulatus, POEY, Anal. Hist. Nat., 346, 1881, Porto Rico.
Chilomycterus antennatus, KAUP, Wiegm. Archiv 1855. 232; GÜNTHER, Cat., VIII, 311, 1870.

Subgenus CHILOMYCTERUS.

2169. CHILOMYCTERUS ATINGA (Linnæus).

(ATINGA.)

Head $2\frac{2}{3}$; depth $2\frac{2}{3}$. D. 12 or 13; A. 12 or 13; P. 12; C. 10. Spines very short, compressed, with long, strong, flat, ridged roots, the anterior root the longest; supraocular cirrus well developed. Forehead flat, without spine. Three feeble supraorbital spines, the inner root of the foremost overlapping frontal bones. Nostrils in front of orbit. Generally 2 osseous stripes across back of tail, behind dorsal fin; abdominal ossifications nearly as much developed as those on back; 8 in a longitudinal series nearest to median line of back. Body and fins mostly covered with small round black spots; a large black blotch before and around dorsal; another on each side above gill opening and pectoral; spots of the back more or less ocellated, and of the size of the pupil; those of the fins much smaller. West Indies, north to Bermuda and Florida Keys, common southward; readily known by the spotted fins. (*atinga*, a Portuguese name of the species in Brazil.)

Orbis muricatus et reticulatus, LISTER, in Willughby, Historia Piscium, 155, pl. I. No. 7, fair. 1686, no locality.

Ostracion subrotundus aculeis undique brevibus triquetris raris, ARTEDI, Genera, 59, 1738, description from a specimen seen in the Green Dragon at Stepney, presumably of this species, as LISTER is quoted in the synonymy, and his figure is characteristic.

Ostracion bidens sphæricus aculeis undique densis triquetris. ARTEDI, Genera, 59, 1738, based on a specimen in the collection of Seba at Amsterdam "*maculæ nigræ latæ, ad pinnas et caudam;*" reference in synonymy to *Atinga alter minor orbicularis*, LISTER, in Willughby, Historia Piscium, 155, 1686, which seems to be *Chilomycterus spinosus*.

Diodon atinga (misprinted *atringa*), LINNÆUS, Syst. Nat., Ed. X, 334, 1758, India: after *Ostracion bidens sphæricus* of ARTEDI; not of most later authors.

Diodon reticulatus, LINNÆUS, Syst. Nat., Ed. x, 334, 1758, India; after *Ostracion subrotundis*, etc., ARTEDI; GÜNTHER, Cat., VIII, 313, 1870.
Chilomycterus reticulatus, JORDAN & GILBERT, Synopsis, 966, 1883.

2170. CHILOMYCTERUS CALIFORNIENSIS, Eigenmann.

No tentacles anywhere. Spines of back all low, those of front especially so, increasing in size toward belly where they become much larger than those of back. No spine on middle of forehead. A spine at upper anterior angle of orbit; 1 above, somewhat behind its middle; 1 slightly behind and above its upper posterior angle; another halfway between the last and the upper angle of pectoral, and another before and a little above the upper margin of pectoral. Blue above, white below; forehead and bases of all the fins with small (1/16 in.) dark spots, fewer on anal; back densely covered with short streaks or bars, which become larger spots on sides; a few round dark spots (¼ inch in diameter) on belly; spots below eye larger than those on forehead, similar in size to those on caudal peduncle. Length 9⅞ inches. San Pedro, California. (Eigenmann). Apparently very rare; only the type known.

Chilomycterus californiensis, EIGENMANN, Amer. Nat., v, 1891, 25, 1133, San Pedro, California. (Coll. C. H. Eigenmann.)

685. LYOSPHÆRA, Evermann & Kendall.

Lyosphæra, EVERMANN & KENDALL, Bull. U. S. Fish. Comm. 1897, 131 (*globosa*).

This genus is distinguished from *Chilomycterus* by its armature of flattish, papery or cartilaginous plates to which are attached minute hair-like papillæ. The nostril, as in *Diodon*, is undivided and has 2 lateral openings. (*λύω*, to loose, i. e., lax, flabby; *σφαίρα*, sphere, ball.)

2171. LYOSPHÆRA GLOBOSA, Evermann & Kendall.

Head 3½; depth 1¼; eye 3½ in head; snout 4. D. 11; A. 4. Form oblong ovoid; head broad, interorbital space slightly convex, broad, its width 1½ in head. Dorsal and anal far back, each separated from the caudal by a space equal to ⅔ diameter of eye, each very small, the anal rays scarcely distinguishable; pectoral broad and short, about 20 rays, the length less than interorbital width. Tooth of each jaw solid and continuous. Entire body sparsely covered with minute hair-like appendage, or very flexible dermal papillæ, these very short (1/32 inch long), appearing to be 2-rooted, and attached to flattish, papery or cartilaginous plates. Nostril in a short papilla with 2 lateral openings and no division at tip. Ground color yellowish white, this color regularly broken up into numerous roundish or hexagonal spots by a network of dark brown, the width of the brown spaces being usually less than ¼ the diameter of the spots which are smallest on back and top of head; a villous papilla in the center of each spot. Length of type 1¾ inches. Atlantic coast of the United States; known from the mouth of the Rappahannock River and from Biscayne

Bay, Florida. The 2 specimens from the Rappahannock agree closely in color, but the 1 from Cape Florida, which appears to be a younger individual, differs from them somewhat in color. It may be described as being pale yellowish white, with about 50 narrow dark-brown or blackish rings or circles, each inclosing a circular spot of the pale yellowish white, these circles smallest on the back and not touching each other anywhere; on the belly they are distant from each other a distance about equal to their own diameter. It seems that as the fish grows older these dark rings approach each other and finally unite to form the reticulations seen in the 2 other specimens. We were at first disposed to regard these specimens as being the young of some known species, or possibly *Trichodiodon pilosus** (Mitchill), but an examination of De Kay's figure† shows that they can not be Mitchill's species. It is equally apparent that they can not be Cuvier's *Diodon asper*‡ or Günther's *Trichocylus erinaceus*§. (Evermann & Kendall.) (*globosus*, spherical.)

Lyosphæra globosa, Evermann & Kendall, Bull. U. S. Fish Comm. 1897, 131, pl. 9, figs. 11 and 12, Rappahannock River, near mouth of Windmill Creek, Virginia. (Type, No. 48794, U. S. Nat. Mus. Coll. Evermann & Kendall.)

Family CLXXV. MOLIDÆ.

(The Head-fishes.)

Body oblong or more or less short and deep, compressed, truncate behind, so that there is no caudal peduncle. Skin rough, naked, spinous, or tessellated. Mouth very small, terminal; teeth completely united in each jaw, forming a bony beak without median suture, as in the *Diodontidæ*. Dorsal and anal fins similar to each other, falcate in front, the posterior parts more or less perfectly confluent with the caudal around the tail; no spinous dorsal; no ventral fins; pelvic bone undeveloped; pectorals present. Belly not inflatable; gill openings small, in front of pectorals; an accessory opercular gill; no air bladder. Fishes of the open seas, apparently composed of a huge head to which small fins are attached. Genera 3, species about 6, found in most warm seas, pelagic in habit, and reaching a very large size. The very young are variously shortened in form and armed with spines. These have been often regarded as a distinct genus (*Molacanthus*). The flesh in these fishes is coarse and tough, and they are not used as food. (*Gymnodontes*, group *Molina*, Günther, Cat., VIII, 317–320, 1870.)

Molinæ:

a. Body suborbicular, not twice as long as deep; skin thick, rough, gristly, without hexagonal plates. Mola, 686.

Ranzaniinæ:

aa. Body oblong, about twice as long as deep; skin smooth, tessellated, with smooth hexagonal plates. Ranzania, 687.

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* *Diodon pilosus*, Mitchill, Trans. Lit. and Phil. Soc., Vol. I, 1815, 471, pl. 6, fig. 4.

† De Kay, N. Y. Fauna: Fishes, 326, pl. 55, fig. 180, 1842.

‡ *Diodon asper*, Cuvier, Mém. du Museum, IV, 1818.

§ Günther, Cat., VII, 316, 1870.

686. MOLA, Cuvier.

(HEAD-FISHES.)

Mola, CUVIER, Tableau Élém. Hist. Nat. Animaux, 323, 1798 (*rotunda* = *mola*).

Orthragoriscus, BLOCH, Syst. Ichth., Schneider Ed., 510, 1801 (*mola*); misprint for *Orthagoriscus*.

Cephalus, SHAW, General Zoology, v, 2, 432, 1804 (*mola*).

Orthragus, RAFINESQUE, Caratt. Alc. Nuov. Gen. e Nuov. Sp. Anim. e Piante della Sicilia, 17, 1810 (*luna* = *mola*).

Diplanchias, RAFINESQUE, Caratt. Alc. Nuov. Gen. e Nuov. Sp. Anim. e Piante della Sicilia, 17, 1810 (*nasus* = *mola*).

Tympanomium, RANZANI, Novi Comm. Ac. Sci. Bonon., v, 3, pl. after p. 81, 1837 (*planci* = *mola*).

Trematopsis, RANZANI, Novi Comm. Ac. Sci. Bonon., v, 3, pl. after p. 81, 1837 (*willughbeii* = *mola*).

Ozodura, RANZANI, Novi Comm. Ac. Sci. Bonon., v, 3, pl. after p. 81, 1837 (*orsini* = *mola*).

Pedalion (GUILDING MS.) SWAINSON, Nat. Hist. and Class'n Fishes, etc., v, 1, 199; v, 2, 195, 329, 1839.

Alcdon, CASTELNAU, Mém. sur Poissons Afrique Aust., 75, ?1860 (*storeri* = *mola*).

LARVAL FORMS.

Molacanthus, SWAINSON, Nat. Hist. and Class'n Fishes, etc., v, 2, 195, 329, 1839 (*pallasi*).

Pallasia, NARDO, Ann. Sci. Regno Lombard., Venet., v, 10, 112, 1840 (*pallasi*).

Acanthosoma, DE KAY, New York Fauna: Fishes, 330, 1842 (*carinatum*).

Centaurus, KAUP, Archiv. Naturgesch. 1855, I, 221 (*boops*).

Body ovate, strongly compressed, covered with a thick, rough, leathery, elastic skin, which is without bony plates. Profile forming a projecting fleshy nose above the mouth. Dorsal fin beginning not far behind pectorals, short and high, falcate, confluent with the anal around the tail; no large spines on the body. Clumsy fishes, found in most warm seas, reaching a great size; the young (*Molacanthus*)* with the body deeper, much compressed, without trace of caudal fin, its place taken by a row of marginal spines. (*mola*, a millstone.)

2172. MOLA MOLA (Linnæus).

(SUNFISH; HEAD-FISH; MOLA; PEZ LUNA.)

Head 3; depth 1⅗. D. 17; A. 16. Dorsal and anal fins high in front, rapidly decreasing backward, the height of each about 2½ in length of body in adult; caudal fin low, with a wavy outline. Depth always more than ½ length, and in the young the vertical diameter exceeding the longitudinal. Form varying much with age, the body becoming more elongate, the fins comparatively shorter, the eye much smaller, and a hump being developed above the mouth, topped by an osseous tubercle. Dark gray; sides grayish brown, with silvery reflections; belly dusky; a broad blackish bar running along the bases of the dorsal, caudal, and anal fins. Pelagic, inhabiting most temperate and tropical seas, swimming slowly about, near the surface, the high dorsal above the surface. Common northward to England, Cape Cod, and San Francisco; rare in the West Indies. It reaches a weight of 300 to 1,500 pounds. The largest specimen known to us was taken at Redondo Beach, California, in June, 1893, and mounted by Mr. T. Shooter, of Los Angeles. This was 8 feet 2 inches long and weighed in life 1,800 pounds. The Pacific Ocean form, which ranges from San Francisco to Mazatlan, seems to be fully identical with *Mola mola*. (Eu.) (*mola*, a millstone.)

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* The nominal genus *Molacanthus*, Swainson (*Pallasia*, Nardo; *Acanthosoma*, De Kay) has thus been defined: Body suborbicular, much compressed, deeper than long, covered by a thin silvery skin on which are many strong spines. Dorsal and anal fins high and short, not confluent, the space on the tail between them occupied by a row of small spines; no interspinal bones for the support of the caudal; pectorals moderate. Intestines short, with but 2 turns. These small fishes were long generally considered as the young of *Mola*. The researches of Prof. Frederick Ward Putnam (Am. Nat., Dec., 1870) seemed to show that they were adult fishes allied to *Mola*, careful comparisons having been made by him between *Molacanthus* and the young of *Mola*. In a specially valuable paper "On the origin of heterocercy and the evolution of the fins and fin rays of fishes" (Rept. U. S. Fish Comm. for 1884), the late Prof. John A. Ryder, of the University of Pennsylvania, has carefully discussed the relations of *Molacanthus* to *Mola*. The researches of Professor Ryder leave no doubt that *Molacanthus* is simply a post-larval phase in the development of *Mola*, as was supposed by Lütken, Steenstrup, and Günther. According to Ryder, the earliest forms of *Mola* (corresponding to the form called *Ostracion boops* by Richardson) will be found to have a distinct tail.

Tetrodon mola, Linnæus, Syst. Nat., Ed. x, 334, 412, 1758, Mediterranean; after *Ostracion cathetoplatcus subrotundus*, Artedi, Genera, 61, 1738.
Tetrodon lune, Lacépède, Hist. Nat. Poiss., i, 509, 1798.
Mola aculeata, Kolreuter, Nov. Comm. Petropol., x, 1766, 337, pl. 8, figs. 2 and 3.
Orthragoriscus hispidus, Bloch & Schneider, Syst. Ichth., 511, 1801.
Orthragoriscus or *Luna piscis*, Rondelet, De Piscibus, 424.
Diodon carinatus, Mitchill, Ann. Lyc. Nat. Hist. New York, ii, 1815, 264, pl. 5, fig. 1, New York.
Acanthosoma carinatum, De Kay, New York, Fauna: Fishes, 330, pl. 55, fig. 179, 1842.
Mola rotunda, Cuvier, Tableau Elem. Nat. Hist., 323, 1798; after *Tetrodon mola*, Linnæus; Jordan & Gilbert, Synopsis, 865, 1883.
Orthagoriscus mola, Bloch & Schneider, Syst. Ichth., 510, 1801.
Orthagoriscus fasciatus, Bloch & Schneider, Syst. Ichth., 511, 1801.
Cephalus brevis, Shaw, Gen. Zoology, v, 437, pl. 175, 1804.
Cephalus pallasianus, Shaw, Gen. Zool., v, 440, 1804.
Orthagoriscus spinosus, Cuvier, Régne Anim., 1817.
Cephalus orthagoriscus, Risso, Eur. Mérid., iii, 173, 1826.
Ozodura orsini, Ranzani, Nov. Comm. Ac. Sci. Inst. Bonon., iii, 82, 1839, Mediterranean Sea; Ranzani, *l. c.*, pl. 6, 1839.
Tympanomium planci, Ranzani, *l. c.*, table, 1839, Adriatic Sea.
Diplanchias nasus, Ranzani, *l. c.*, table, "in marei siculó."
Trematopsis willugbei, Ranzani, *l. c.*, table, in oceano.
Orthragoriscus retzii, Ranzani, *l. c.*, table, no locality.
Orthragoriscus ghini, Ranzani, *l. c.*, table, Mediterranean Sea.
Orthragoriscus rondeletii, Ranzani, *l. c.*, Mediterranean Sea.
Orthragoriscus blochii, Ranzani, *l. c.*, "in mari oceano."
Orthragoriscus alexandrini, Ranzani, *l. c.*, Adriatic Sea.
Orthragoriscus redi, Ranzani, *l. c.*, Mediterranean Sea.
Orthragoriscus oculeatus, Ranzani, *l. c.*, no locality.
Orthragoriscus lunaris, Gronow, Cat. Fishes, Ed. Gray, 165, 1854, Mediterranean Sea.
Orthragoriscus solaris, Gronow, Cat. Fishes, Ed. Gray, 165, 1854, Mediterranean Sea.
Orthragoriscus elegans, Ranzani, *l. c.*, Atlantic Ocean.
Orthragoriscus battaræ, Ranzani, *l. c.*, Adriatic Sea.
Aledon storeri, Castelnau, Poiss. Afr. Austr., 75, 76.
Aledon capensis, Castelnau, *l. c.*
Pallasia pallasi, Nardo, Ann. Sc. Regno Lombard. Venet., x, 112, 1840.
Orthagoriscus analis, Ayres, Proc. Cal. Ac. Sci., ii, 1854, 31, fig. 54, San Francisco.
Mola nasus, Steenstrup & Lütken, Overs. Dansk. Vid. Selsk. Forh., 36, 1863.
Mola retzii, Steenstrup & Lütken, *l. c.*
? *Orthagoriscus*, sp., Swinhoe, Ann. & Mag. Nat. Hist., xii, 1863, 225.

Orthragoriscus ozodura, HARTING, Verhand. Ak. Wet. Amsterd., 1-48, pls. 1-8, 1868.
Ostracion boops, RICHARDSON, Voy. Erebus & Terror, Ichth., 52, 1844, South Atlantic.
Centaurus boops, KAUP (very young larva), Archiv. Naturg., I, 1855, 221.

687. RANZANIA, Nardo.

(KING OF THE MACKERELS.)

Ranzania, NARDO, Ann. Sci. Regn. Lombard. Venet., V, 10, 105, 1840 (*truncatus*).

Body oblong, the depth about ½ height; skin smooth, tessellated, divided into small hexagonal scutella; caudal truncate; otherwise essentially as in *Mola*, the size smaller; the larval forms unknown. Pelagic. (Named for Camillo Ranzani, of Bologna, an excellent naturalist, who was led by the variations in the form of *Mola* to an ineffective subdivision of the species into many genera.)

2173. RANZANIA TRUNCATA (Retzius).

Head not quite 3; depth about 2. D. 16 to 19; P. 12 or 13; A. 19; C. 18 to 22. Body elongated ovate with the sides compressed. Eye 2 to 3 times in snout; snout straight; mouth anterior and opposite center of eye. Caudal very short, its base straight, slightly oblique; dorsal and anal at the extreme end of dorsal and abdominal profiles and connected to the caudal; pectoral somewhat pointed. Skin smooth and divided into small hexagonal plates like mosaic. Color: "Immediately before death the colors were most brilliant, the back being of a dark purple, gradually decreasing in intensity to the belly, which was white with golden reflections, the side marked with green lines on the purple; toward the tail there were several irregular white spots about the size of a threepenny piece; the dorsal, anal, and pectoral fins were of a pale lead color, but the caudal fin was most brilliant, being of a bright burnished silver, with prismatic reflections, the rays tinged with purple, while between the rays there were keyhole-shaped markings, edged with gold, forming such a brilliant combination of colors as is not easily imagined; but this brilliancy entirely vanished a few minutes after the death of the fish, when it assumed the dull-blue color of the figure in Couch's Fishes of the British Isles, which is exceedingly good, but might have been a few shades darker." (S. Clogg, Zool., 342, 1883.) Borlase's specimen was dapple, spotted darker on the back, with streaks ½ inch wide from eye to pectoral fin. (Day.) Size much less than that of *Mola mola*, the length about 2 feet. Pelagic; occasional off our Atlantic coast; once taken on the Bermudas. A related but apparently different species * is occasionally taken

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**Ranzania makua*, JENKINS. The following is the substance of Dr. Jenkins's description of this species:

"D. 17; A. 18; C. 19; P. 13. Depth 2⅛ in length to base of caudal; head 2⅝; eye 6 in head, 2⅓ in snout. Body much compressed, the ventral margin a sharp, evenly curved keel. Eye much above axis of body, a little nearer snout than base of pectoral. Teeth forming a turtle-like beak, completely hidden by projecting folds of skin, which form a truncated opening to the mouth. Gill opening just in front of upper base of pectoral, covered by a 2-lobed valve. Body covered by an armor of small plates, more or less hexagonal and concealed. Pectoral about 1½ in head, above axis of body; height of dorsal about equal to head; anal slightly lower; dorsal and anal each separated from the caudal by a notch. Color bright silvery on sides, upper parts dark; sides with brighter silvery bands, the first 3 with distinct black borders, the next 4 with numerous black spots, the black margins appearing only on lower parts. Differing from *Ranzania truncata* chiefly about the Hawaiian Islands, where it is regarded with veneration as the king of the tunnies and mackerels. (*truncatus*, cut off short.)

Tetrodon truncatus, RETZIUS, Vet. Ak. Nya Handl., VI, 2, 116, 1785.
Orthagoriscus oblongus, BLOCH & SCHNEIDER, Syst. Ichthyol., 511, 1801.
Cephalus varius, SHAW, Gen. Zool., V, 439, 1804.
Cephalus elongatus, RISSO, Eur. Mérid., III, 173, 1826.
Mola planci, NARDO, in Férussac, Bull. Sci. Nat., XIII, 437, 1828.
Cephalus cocherani, TRAILL, Werner. Mem., VI, 1832.
Orthagoriscus truncatus, GÜNTHER, Cat., VIII, 319, 1870; DAY, Fish. Gt. Brit., pl. 149, 276, 1884.
Ranzania truncata, JORDAN & GILBERT, Synopsis, 966, 1883.

Suborder LORICATI.*

(THE MAIL-CHEEKED FISHES.)

This group is distinguished by a single peculiar character, the extension of the third suborbital bone across the cheek to or toward the preopercle. From the *Craniomi*, an offshoot from the same group, in which the development of the suborbital stay is carried much farther, the present group is distinguished by the normal character of the shoulder girdle. The following definition of the *Loricati* is given by Dr. Gill (Proc. U. S. Nat. Mus. 1888, 589):

> Acanthopterygians with the scapular arch normal, the post-temporal and postero-temporal forming part, and the latter intervening between the post-temporal and the proscapula. Infraorbital chain with all bones entering into the orbital margin and functional, only partially extended over the cheek; with the third bone hypertrophied and developed as a stay impinging on the anterior wall of the preoperculum; post-temporal variously connected with the epiotic and pterotic; intermaxillaries with well-developed ascending pedicles gliding over the front of the prosethmoid.

In all other respects the group is subject to great variation. Concerning this, Dr. Gill has the following excellent discussion:

> In view of the wide range of variation that has been shown to be manifested by the various members of the great group of mail-cheeked fishes it may be considered that it is not a natural group. In one sense it is not. The differences are certainly sufficient to justify the segregation of its elements, not only into a number of families but into seven superfamilies. Nevertheless, the relations between the various members are such as to indicate that they form a natural although much-interrupted series, and the guess of Cuvier is apparently justified by a detailed examination of the anatomy.
>
> The most generalized of the mail-cheeked fishes appear to be the *Scorpænoidea*. These have the general form of ordinary fishes like the Serranids, Sparids, and numerous others.

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in the smaller eye, in having the eye placed well above the mouth and above the axis of the body, in the high position of the pectoral fin, in the higher dorsal and anal, and in the coloration. Known only from 1 specimen in L. S. Jr. Univ. Mus., 20 inches long, taken at the mouth of Pearl Harbor. Honolulu, by Mr. Hiel Kapu, and sent to Stanford University by Mr. Charles B. Wilson. (*makua*, the native name of the fish, meaning the source from which the Bonito and the Albicore sprung in ages past.')"

Ranzania makua, JENKINS, Proc. Cal. Ac. Sci., series 2, V, October 31, 1895, 780 to 784, with colored plate.

* Called *Cataphracti* on page 781, but *Loricati* is the earliest single word applied as a name to this group. Dr. Gill remarks: "Cuvier gave no latin name to the '*Joues cuirassées*,' and it has been attempted to remedy the defect by the proposal of various names involving the idea, e. g., *Buccæ Loricatæ* (McMurtrie, 1831), *Loricati* (Jenyns, 1835), *Pareiplonidæ* and *Pareoplitæ* (Richardson, 1836), *Canthileptes* (Swainson, 1838), *Cataphracti* (Müller, 1843), *Scleroparei* (Gravenhorst, 1845), *Sclerogenidæ* (Owen, 1846), and *Cataphractoidæ* (Cantor, 1850)."

Osteology also corroborates the nearer relationship of those forms to the normal Acanthopterygian fishes. If we look among those normal forms for the nearest relatives of the mail-cheeked fishes, in the present state of our knowledge, we appear to at least approximate the truth in claiming for them a nearer relationship with the Cirritids than any others. This view, however, is simply hypothetical, and can not be considered to be established until we become better acquainted with the anatomy of the various members of the suborder *Acanthopterygii*. Which of the *Scorpænoidea* are the most generalized is a more difficult question to answer.

In some respects the Chirids, or Hexagrammids, appear to be more generalized than the Scorpænids. They are less armed with spines than the other representatives of the great group of mail-cheeked fishes, and, what is still more significant, the dichost or basisphenoid is more developed and approaches in form that exemplified in the normal Acanthopterygians; nevertheless, the parietal bones converge toward the front so as to almost, if not quite, touch over the front of the supraoccipitine. The parasphenoid sends elongated processes upward to meet corresponding processes of the subtectals or orbitosphenoids. In both of these characters they deviate from the Scorpænids and approach the Cottids. For this reason, therefore, they are placed after the Scorpænids and before the Cottids. The comparatively slight value of the approximation or separation of the parietals thus appears and demonstrates that it is inadvisable to separate widely groups resembling each other in so many characters because of such differences.

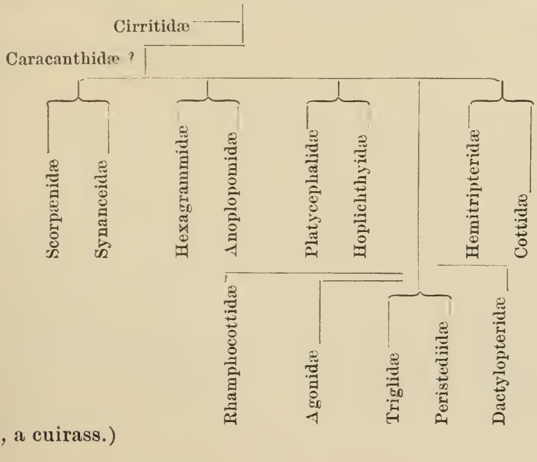
An elongate spinous portion of the dorsal fin and an inversely short rayed portion are developed in the Hemitripterids; nevertheless, those fishes agree in most osteological as well as most external characters with the Cottids; consequently, the unnaturalness of removing them far from the Cottids and associating them with the Scorpænids, as well as the slight value of the relative proportions of the spinous and rayed portions of the dorsal fin, becomes evident.

The osteological characters of the Platycephalids and Hoplichthyids are imperfectly known, and it remains for future investigation to determine what are their exact relationships and characteristics.

The Triglids and Peristediids depart very widely from the other groups, as will become hereafter manifest; but, notwithstanding, their relationships appear to be more intimate with the generalized mail-cheeked fishes than with any other group.

The Dactylopterids depart still more from all other fishes than do the *Trigloidea*. We look in vain, however, for any nearer relation of those fishes than the *Trigloidea*, and consequently it may be assumed that they are the derivatives from a type from which the Triglids have least diverged.

In fine, the relationships of the various families of mail-cheeked fishes, in the present state of our knowledge, may be expressed in the following genealogical tree, in which the left-hand branch in each case represents the more generalized type of each pair:



(*lorica*, a cuirass.)

FAMILIES OF LORICATI:

- *a.* Myodome[*] more or less developed.
  - *b.* Post-temporal bifurcate and connected with the cranium by its processes in normal manner.
    - *c.* Body and head compressed or moderately depressed.[†]
      - *d.* Actinosts moderate and inserted on posterior edges of hypercoracoid and hypocoracoid; ribs, typically, borne on enlarged parapophyses.
        - *e.* Gills 3½ or 4, the slit behind the last gill small or wanting; spinous dorsal well developed; anal with 3 strong spines, the fin rather short; body covered with scales; a single lateral line; top of head more or less armed; vertebræ rather few, 24 to 31. SCORPÆNIDÆ, CLXXVI.
        - *ee.* Gills 4, with a large slit behind the fourth; body covered with small scales; cranium unarmed; dorsal and anal fins elongate; vertebræ numerous, more than 30.
          - *f.* Nostrils normal, the posterior well developed. ANOPLOPOMATIDÆ, CLXXVII.
          - *ff.* Nostrils single, the posterior represented by a small pore well behind the other and not functional. HEXAGRAMMIDÆ, CLXXVIII.
      - *dd.* Actinosts large and partly intervening between the hypercoracoid and the hypocoracoid; ribs sessile on the vertebræ; vertebræ numerous, 30 to 50; no anal spines; body not uniformly scaled. COTTIDÆ, CLXXIX.
  - *bb.* Post-temporal expanded and connected with the cranium by an extensive suture.
    - *g.* Anus submedian; ventrals subabdominal; gill openings very small; exoskeleton developed as spiniform prickles; head excessively large. RHAMPHOCOTTIDÆ, CLXXX.
    - *gg.* Anus thoracic; ventrals subbrachial; gill opening moderate; exoskeleton developed as plates arranged in about 8 longitudinal rows; spinous dorsal short or wanting. AGONIDÆ, CLXXXI.

DISCOBOLI:

- *aa.* Myodome completely wanting; ventrals completely united, forming a round sucking disk, which is rarely obsolete; spinous dorsal little developed.
  - *h.* Body cavity elongate; caudal region short. CYCLOPTERIDÆ, CLXXXII.
  - *hh.* Body cavity short; caudal region elongate; skin smooth. LIPARIDIDÆ, CLXXXIII.

Family CLXXVI. SCORPÆNIDÆ.[‡]

(THE ROCK-FISHES.)

Body oblong, more or less compressed, the head large, and with one or more pairs of ridges above, which usually terminate in spines. Opercle usually with 2 spinous processes; preopercle with 4 or 5. Mouth terminal, usually large, with villiform teeth on jaws and vomer, and usually on the palatines. Premaxillaries protractile; maxillary broad, without supplemental bone, not slipping under preorbital. Gill openings wide, extending forward below; the gill membranes separate and free from the isthmus; usually no slit behind the fourth gill. Scales ctenoid, or sometimes cycloid, usually well developed, sometimes nearly obsolete. Lateral line single, continuous, concurrent with the back; a narrow bony stay extending backward from the suborbital toward the preopercle. Ventral fins thoracic, of the normal percoid form, I, 5, the rays branched; dorsal fin continuous, sometimes so deeply notched as to divide it into 2 parts, with 8 to 16 rather strong spines and about as many soft rays; anal rather short, with 3 spines and 5 to 10 soft rays; soft rays in all the fins branched, except some or all of rays of the pectorals; pyloric cæca in moderate or small number (less than 12). Pseudobranchiæ large. Air bladder usually present. Actinosts moderate, inserted on the posterior edges of hypercoracoid and hypocoracoid; ribs borne on enlarged pleurapophyses. Post-temporal bifurcate, normally connected; myodome more or less developed. Genera about 30; species about 250, inhabiting all seas, but especially abundant in the temperate parts of the Pacific Ocean, where they form a large proportion of the fish fauna. They are nonmigratory fishes living about rocks. Most of them are of large size, and all are used as food. Many of them are viviparous, the young being produced in great numbers when about ¼ inch in length. (*Triglidæ*, group *Scorpænina*, Günther, Cat., II, 95, 1860.)

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[*] Myodome or muscular tube, "a chamber for the rectus muscles of the eye. This is isolated from the brain cavity by the development of a platform from the basioccipital continuous with horizontal ridges or shelves diverging from the inner walls of the prootic bones and meeting along the middle, thus constituting a roof for the muscular chamber and a floor for the cranial cavity." (Gill.)

[†] Body and head much depressed in the family of *Platycephalidæ* and its relatives, groups not represented in the Western Hemisphere. Two species of *Platycephalus* have been erroneously ascribed to the region under consideration. These are mentioned on page 2028.

[‡] The original draft of the account of this family is contributed by Mr. Frank Cramer; to this numerous additions have been made by the present authors. Some of the descriptions are adapted from those in Jordan & Gilbert's Synopsis Fishes N. A. All these have been verified on new material.

SEBASTINÆ:
a. Dorsal spines more than 12; vertebræ more than $10 + 14$.
b. Dorsal spines 15 or 16; vertebræ about $12 + 19$; palatine teeth present; top of head scaly, scales ctenoid.
c. Anal III, 7 or 8; pectorals long, narrow; vertebræ $12 + 19 = 31$. SEBASTES, 688.
cc. Anal III, 5; pectorals with lower rays broadened or prolonged into linguiform lobe; vertebræ $11 + 18 = 29$. SEBASTOLOBUS, 689.
bb. Dorsal spines 13 or 14; vertebræ $12 + 15 = 27$.
d. Palatine teeth present. SEBASTODES, 690.
dd. Palatine teeth none. SEBASTOPSIS, 691.

SCORPÆNINÆ:
aa. Dorsal spines 12; vertebræ $10 + 14 = 24$.
e. Palatine teeth present; anal rays usually III, 5.
f. Bones of head scarcely cavernous; occiput with 2 pairs of spines; scales ctenoid or provided with dermal flaps.
g. Pectoral with some of its median rays more or less branched.
h. Scales on top and sides of head ctenoid; cranium much as in *Sebastodes*, the armature moderate. HELICOLENUS, 692.
hh. Scales on top and sides of head cycloid or wanting; cranium with many spines. SCORPÆNA, 693.
gg. Pectoral rays all simple; head more or less scaly, the scales ctenoid. PONTINUS, 694.
ff. Bones of head with large muciferous cavities; occiput with only 1 pair of spines; scales cycloid; pectoral rays 20 or more; head scaleless above; no groove at occiput; some of the pectoral rays branched. SETARCHES, 695.

688. SEBASTES, Cuvier.

(Rose-fishes.)

Sebastes, Cuvier, Règne Animal, Ed. 2, Vol. II, 166, 1829 (*norvegica*=*marinus*).
Eusebastes, Sauvage, Nouv. Archives Mus. Paris (2) I, 1878, 1421 (*norvegicus*).

Body oblong, compressed. Head large, scaly above and on sides; cranial ridges well developed. Mouth terminal, very broad, oblique, the broad short maxillary extending to below the eye; lower jaw projecting, with a bony knob at the symphysis, fitting into a rostral notch; villiform teeth on jaws, vomer and palatines. Eye very large, close to upper profile; preopercle with 5 diverging spines, opercle with 2; suprascapular spines strong; gill rakers long, slender. Scales small, ctenoid, irregularly arranged; no dermal flaps. Dorsal fin continuous, very long, the spinous part much longer than the soft part, of 15 strong spines; anal spines 3, strong; caudal emarginate; pectorals long, narrow. Branchiostegals 7. Vertebræ 12 + 19 = 31. Coloration mostly red. Ovoviviparous. One species known, in the North Atlantic. (σεβαστός, magnificent.)

2174. SEBASTES MARINUS (Linnæus).

(Rosefish; Redfish; Snapper; Hemdurgan.)

Head 3; depth $2\frac{1}{5}$. D. XV, 13; A. III, 7; lateral line 40 (tubes); scales about 85. Body ovate; back elevated, the ventral outline straightish; top of head evenly scaled; interorbital space with 2 low ridges, between which it is concave; nasal spines present; cranial ridges moderate, rather low and sharp, the spines sharp; preocular, supraocular, postocular, tympanic, and parietal ridges present, the latter with the tips abruptly divergent and with parietal and nuchal spines; suprascapular spines very sharp and prominent; opercular spines long and sharp; subopercular spine prominent; preopercular spines slender and sharp, the second longest; suborbital stay close under orbit, not reaching preopercle; preorbital narrow, with 2 spines. Eye exceedingly large, 3 in head, more than twice as wide as interorbital space. Mouth very large, oblique; maxillary very broad, reaching middle of eye, its length $2\frac{1}{3}$ in head; premaxillaries on level of middle of pupil; tip of lower jaw much projecting, with a conspicuous, pointed symphyseal knob; mandible and maxillary scaly; pseudobranchiæ very large; gill rakers long, stiff and strong. Dorsal spines sharp, the longest about as long as eye, the fin deeply emarginate, the soft rays not very high, higher than the spines; caudal narrow, moderately forked; anal spines moderate, graduated, the second a little shorter than eye; pectoral rather long, reaching vent, its base narrow, some of the upper rays divided; ventral reaching to vent. Scales small, irregular, not strongly ctenoid. Orange red, nearly uniform, sometimes a dusky opercular blotch, and about 5 vague dusky bars on the back; peritoneum brownish. Length 18 inches. North Atlantic, abundant on both coasts, especially northward; recorded from the north and west coasts of Europe to the British Channel, rare south of the Faroe Islands; Arctic Ocean, Spitzbergen; Iceland, Greenland; a shore fish as far south as Maine, southward in deeper waters, as far as off coast of middle New Jersey. According to Goode & Bean it breeds abundantly off the south coast of New England in late summer between 100–180 fathoms and there is no reason to believe that the young rise to the surface; the fry were caught by the bushel at these depths. (*marinus*; marine.) An important food-fish beautifully colored. (Eu.)

Perca marina, LINNÆUS, Syst. Nat., Ed. X, I, 290, 1758, Norway; Artedi's reference to *Serranus scriba* erroneously included in the synonymy.

Perca norvegica, ASCANIUS, Icones Rev. Nat. 1772, I, 7, tab. 16, Norway.

Holocentrus sanguineus, FABER, Fische Islands, 126, 1829, Iceland.

Sebastes septentrionalis, GAIMARD, Voy. Islands and Groënland, Poiss, pl. 9.

Sebastes fasciatus,* STORER, Proc. Bost. Soc. Nat. Hist., V, 31, 1854, Provincetown, Mass.; young specimen, said to have but 13 dorsal spines.

Perca norwegica, MÜLLER, Zoöl. Danica, 46, 1779.

Sebastes norwegicus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 327, pl. 87, 1829; RICHARDSON, Fauna Boreali-Amer., 52, 1836; STORER, Hist. Fishes Mass., 38, pl. 8, fig. 1, 1867; GÜNTHER, Cat., II, 95, 1860; GÜNTHER, Challenger Report, XXII, Deep Sea Fishes, 17, 1880; COLLETT, Norges Fishes, 19; DAY, Fishes of Great Britain, I, 42, pl. 18; GOODE & BEAN, Bull. Essex Inst., XI, 14.

Sebastes marinus, WHITE, Cat. Brit. Fish., 8; COLLETT, Norske Nordhavs Expedition, Fiske, 15, pl. 1, figs. 3 and 4, 1880; JORDAN & GILBERT, Synopsis, 651, 1883; LILLJEBORG, Sveriges och Norges Fiskar, 92, 1891; GOODE & BEAN, Oceanic Ichthyology, 260, fig. 248, 1896.

Sebastes viviparus,† KRÖYER, Naturhist. Tidsskr., I, 275, 1844–45, Norway, in shallow water; GILL, Proc. Ac. Nat. Sci. Phila. 1863, 333; GÜNTHER, Cat., II, 96.

Sebastes marinus viviparus, JORDAN & GILBERT Synopsis, 651, 1883.

Sebastes regulus, EKSTRÖM, Skand. Fish., Ed. I, 197, plate only, no description.

689. SEBASTOLOBUS, Gill.

Sebastolobus, GILL, Report Smithsonian Institution 1880, 375 (1881), (*macrochir*).

Pectorals with a wide base, produced backward near the upper margin and not medially, lower rays thickened, extending much beyond rays next above in a linguiform lobe; ventrals directly under axils of pectorals, with the outer rays produced, thick, branched; anal III, 5; vertebræ 11 + 18 = 29; otherwise as in *Sebastes*. Pacific Ocean in deep water. (σεβαστός, *Sebastes*; λοβός, lobe.)

a. Dorsal rays XVI, 9; branchiostegals naked; eye 3⅗ in head. ALASCANUS, 2175.
aa. Dorsal rays XV, 9; branchiostegals scaly; eye 2⅔ in head. ALTIVELIS, 2176.

2175. SEBASTOLOBUS ALASCANUS, Bean.

Head slightly more than 2⅔; depth 4. D. XVI or XVII, 9; A. III, 5; pectoral 22. Lateral line 31 (pores). Body compressed, head large, about as wide as high. Eye large, 3⅗ in head, a little longer than snout. Interorbital space narrow, concave, nearly 3 in orbit, with a pair of obscure longitudinal ridges. Cranial ridges thin and sharp, rather high; nasal, preocular, postocular, tympanic and nuchal spines prominent, sharp, the supraocular and parietal smaller, all arranged in a nearly straight line; a small sharp spine behind orbit, followed by a larger ridge and spine; a rather sharp spine on shoulder; preorbital with 2 broad blunt lobes or spines, with a large pore between them; suborbital ridge nearly continuous from front of preorbital to preopercle, close up under eye, thin and high, with 1 spine under anterior margin of orbit, another under its middle, and 2 behind orbit; uppermost preopercular spine long, with a smaller one in front of its base, the following 4 much smaller, the last one minute; opercular ridges and spines weak. Mouth large, nearly horizontal, maxillary reaching nearly to posterior margin of orbit, about 2 to 2⅖ in head; jaws equal, the lower included laterally and terminating with a slight symphyseal knob; anterior ends of premaxillaries enlarged, dentigerous, with a prominent bony projection, and widely separated by an interval into which fits the tip of lower jaw. Teeth in very narrow bands on vomer and palatines, in broader bands on jaws. Gill rakers short, denticulate, about 11 movable and about 5 rudiments on anterior limb of first arch. Pseudobranchiæ rather large. Dorsal spines rather low, the fourth and fifth longest, about 3⅔ in head, the thirteenth and fourteenth very short, more than 3 in the fifth; second anal spine longest and strongest, 2½ in head, a little longer than soft rays, but not reaching their tips when laid back; origin of ventrals under base of pectorals; pectoral rays long, reaching to vent, and much beyond tip of ventrals; rays nearly all branched, the upper much longer, about 7 lower rays broad and exserted; base of pectoral not procurrent, broad, 3¾ in head. Scales on body large, strongly ctenoid, those on head partly cycloid; mandible, branchiostegal membranes, and tip of snout naked; maxillary with a patch of scales; preopercle with a few; preorbital, cheeks and interorbital space scaly; basal half of pectoral membranes and whole of rays, basal part of spinous dorsal, basal half of soft dorsal membranes and whole length of rays and the ventrals, caudal and anal almost entirely scaled; breast scaly; basal part of ventrals naked. Color red; a dark patch between first and third dorsal spines, another between sixth and eleventh; distal parts of caudal and ventrals and lower rays of pectorals dark; gill cavities somewhat dusky; peritoneum white. Bering Sea and Pacific coast of Alaska, Washington, Oregon, and California, in 109 to 786 fathoms. Here described from specimens obtained by the *Albatross*. (*alascanus*, Alaskan.)

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* Body elongated, not convex in front of dorsal fin; 4 distinct dark-brown transverse bands on the sides, the broadest at the posterior portion of the body. Dorsal XIII, 14; anal III, 7. (Storer.) This is doubtless a young example of *Sebastes marinus*, and not a *Sebastodes*.

† *Sebastes viviparus* is thought to be a shore form or variety of *Sebastes marinus*. We have not been able to distinguish it. The characters alleged are the following:

General color brownish red, somewhat mottled, with a blackish blotch on the opercle, and some other brownish spots on the body. Pectoral fins a little longer than in *Sebastes marinus*; interocular space rather narrower. Head 3¼; depth 3¼. D. XV, 14; A. III, 8. Northern seas of Europe; smaller than the preceding, and living near shore; thought to be a shallow water variety; perhaps confined to the fjords and deep bays of the North.

Sebastolobus alascanus, BEAN, Proc. U. S. Nat. Mus. 1890, 44, off Trinity Islands, Alaska, in 159 fathoms (Coll. *Albatross*); GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 409.*

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* Dr. Gilbert has the following note on *Sebastolobus alascanus:*

"Resembling closely *S. macrochir*, but differing constantly in the increased number of dorsal spines, 16 (17 in one specimen) instead of 15, and in the longer second anal spine. Head 2⅗ in length; depth 4 (in specimen 360 mm. long). Pores of lateral line 35. Dorsal XVI, 9; anal III, 5; pectoral 21. Mouth large, the maxillary nearly reaching vertical from posterior border of orbit, 2 to 2⅕ in head, its width greater than diameter of pupil. Premaxillary band of teeth wide, shutting largely outside mandible in front and on the sides; a conspicuous tubercle at tip of each premaxillary with a deep emargination between the two, into which fits the tip of the mandible. A small knob at mandibular symphysis. Eye large, 3¼ to 3½ in head, 2¾ times the interorbital width. Cranial ridges and spines about as in the other species of the genus, but the occipital ridges not strongly diverging, as in *S. macrochir*. Preorbital posteriorly with a spinous point, as in *S. altivelis*. Dorsal spines low, the contour of the fin evenly rounded, the spines increasing regularly

2176. SEBASTOLOBUS ALTIVELIS, Gilbert.

Body slender, depth 3¾ in length; head 2½; lateral line 33 to 35 pores. D. XV, 9; A. III, 5; pectoral 22. Mouth large, 2 in head, maxillary reaching posterior margin of pupil; mandible laterally and in front shutting within the wide premaxillary band of teeth, its tip fitting into an emargination between premaxillaries, and bearing a short symphyseal knob. Bands of teeth on mandible, vomer, and palatines narrow. Eye very large, 3 in head, 3 times interorbital width. Interorbital narrow, scaled, concave, with 2 low, rounded ridges. Cranial ridges strong, terminating in sharp spines, agreeing with those in *S. alascanus* and *S. macrochir.*[*] Preorbital wide, partially overlapping middle third of maxillary, posteriorly with a forwardly directed triangular spine, in front of which is a long slit-like mucous pore. A blunt tubercle directed forward from front of each premaxillary, less prominent than in *S. alascanus.* Dorsal spines long and comparatively strong, the third always the highest, the outline of fin behind it straight or concave, never convexly rounded, as in *S. macrochir* and *S. alascanus.* In the type specimen the longest spine is contained 1⅔ times in length of head. The spine before the last is scarcely longer than the one preceding, the last spine again lengthened. Second anal spine usually curved, much longer and stronger than third and longer than soft rays, its length 1¾ to 2 in head. In the type it is abnormally curved. Ventrals reaching to vent; pectorals to front of anal; pectoral fin very broad, the lower 7 rays thickened and extended beyond membranes, the lobe thus formed subject to much variation, being unusually short in the type. Scales rough ctenoid. Mandible scaled at base only, the head otherwise completely invested, including the branchiostegal rays and membranes. Fin membranes covered with fine ctenoid scales. Color red; a dark blotch on membranes between first and third

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from the first to the fourth, then as regularly diminishing to the fourteenth: the fifteenth and sixteenth again lengthened. The longest spine is contained from 2½ to 2⅗ times in the length of the head. Second anal spine longer and stronger than third, equaling or exceeding length of soft rays, its length 2 to 2¼ in that of head. Ventrals usually scarcely reaching vent, the pectorals not reaching front of anal. Lower pectoral lobe unusually broad, contains 7 to 9 thickened rays. Head less completely scaled than in *S. altivelis*, the branchiostegals, mandible, maxillary, and lower portion of preopercle wholly naked. Color red; a black blotch occupies the membranes of the first three dorsal spines, a second extends from the sixth to the eleventh spines; margin of pectoral and ventral fins black; no black blotch behind second anal spine; peritoneum and lining of gill cavity white. This species differs from *S. altivelis* in the lower, longer, evenly rounded spinous dorsal, the white lining of the gill cavity, and the partly naked head. It was taken abundantly on the Alaskan expedition, being represented from the following stations: 3227, 3324, 3330, 3331, 3332. 3337, 3338, 3339. 3340, 3343. 3346, 3347, and 3348. These are located in Bering Sea, north of Unalaska Island; in the North Pacific southeast of Unimak Island, and off the coasts of Washington, Oregon, and California, in depths of from 109 to 786 fathoms."

[*] The following is a description of the type of the genus *Sebastolobus* from Japan:

Sebastolobus macrochir (Günther): Head 2½; depth 3¼. D. XV. 6; A. III, 5; P. 22 ($\frac{17}{5}$). Lat. line. about 45. Scales rather regular. Eye very large, much longer than snout, 3 in head. Mouth wide, maxillary reaching beyond middle of eye. Teeth on mandibles, vomer, and palatines in very narrow bands, those on premaxillaries in somewhat broader bands. Interorbital space flattish, narrow, scaleless, about 2½ in orbit. Occipital region flat, with some rudimentary scales. Preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present. Interorbital stay with strong spines. Preopercle with 5 pointed spines. Each ramus of mandible with 3 large pores. Dorsal spines rather feeble, third to sixth longest, 2½ in head. Anal spines stronger, but shorter than longest dorsal spines. Caudal truncate. Pectoral extremely broad, 5 or 6 lower rays elongated beyond those above them, their extremities somewhat thickened, and used like the similar outer ventral rays, as an organ of locomotion. Pectorals reaching vent, ventrals beyond vent. Red, a large black spot on posterior half of spinous dorsal, another between anal spines. Length 11 inches. Inland sea of Japan, off Inosima, 345 fathoms. (Günther.)

dorsal spines, and a large one beginning back of fourth spine and extending along entire upper edge of fin; edge of pectoral, ventral, anal, and sometimes caudal, black. In some specimens a black blotch on membrane back of second anal spine, as in *S. macrochir*. Opercular lining blackish, this visible externally as a dusky blotch. Aleutian Islands. The type is a specimen 325 mm. (12¾ inches) long, taken south of the Alaskan Peninsula of Alaska at a depth of 625 fathoms. No other specimens were secured during the Alaskan expedition of 1890, but the species was later found to be almost equally abundant with *S. alascanus* in deep water off the coast of California. From *S. alascanus* it is distinguishable at sight by the contour of the spinous dorsal fin, the smaller number of dorsal spines, and the dusky lining of the opercle. From *S. macrochir*, with which it agrees in its fin formula, it is distinguished by the greater height of both dorsal and anal spines, and in the different contour of the spinous dorsal.

The following description is taken (by Mr. Cramer) from a specimen from off San Diego:

Head 2½ to 2⅗; depth 3⅔. D. XV, 9; A. III, 5. Transverse row of scales about 33. Body compressed; head rather large, very slightly compressed in region of orbit. Eye very large, orbit 2⅔ in head, nearly twice as large as snout. Interorbital space very narrow, 3½ in orbit, moderately concave, with 2 closely approximated frontal ridges. Cranial ridges thin and sharp, not very high; preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present, arranged in a straight line, all sharp; a sharp spine behind orbit, 2 on shoulder. Mouth large, nearly horizontal; maxillary reaching posterior margin of pupil, 2⅗ in head, somewhat dilated behind. Jaws equal; lower jaw included laterally, and with a very slight symphyseal knob; premaxillaries not meeting in front, each with a small bony prominence; tip of lower jaw fitting into the emargination. Broad bands of teeth on jaws and narrow bands on vomer and palatines. Preorbital rather broad, with 2 large slit-like pores, its lower margin sinuate, without spines; suborbital stay close under rim of orbit, with 3 sharp spines, the sharp, high keel beginning at anterior edge of preorbital and extending across preopercle; preopercular spines small, sharp, diverging, the uppermost largest, with a small spine in front of its base; opercular spines minute. No pit between suborbital stay and orbit. Gill rakers short, 15 on anterior limb; pseudobranchiæ small. No pit at occiput; space between parietal ridges slightly concave. Anterior dorsal spines somewhat curved, the third longest, 2½ in head, the thirteenth about ⅓ as long; longest soft rays about equal to longest spine; second anal spine strongly curved, much stronger and longer than third, about 1⅘ in head, reaching beyond soft rays; ventrals not attached to belly by a membrane; pectorals reaching far beyond ventrals, about to origin of anal; lower 5 rays slightly thickened, exserted, rays all branched; base of fin broad, about 3½ in head, not procurrent. Scales of body large, very strongly ctenoid, easily deciduous, those on head cycloid; maxillary, preorbital, cheeks, interorbital space, opercle, breast and branchiostegal membranes scaly; fins thickly covered with cycloid scales; lower jaw naked. Color in alcohol reddish; a small dark blotch between first and third dorsal spines; spinous dorsal black-edged; tips of caudal and ventral fins and of posterior anal and lower pectoral rays dusky; peritoneum silvery with scattered small black spots. Length about a foot. Alaskan Peninsula to San Diego, in deep water. (*altivelis; altus*, high; *velum*, sail.)

Sebastolobus altivelis, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 410, pl. 23, south of the Alaskan Peninsula at Albatross Station 3338, in 625 fathoms. (Type, No. not assigned, U. S. Nat. Mus. Coll. Gilbert.)

Sebastes macrochir, GÜNTHER, Challenger Report, Shore Fishes, 65, pl. 27, 1880, Inland Sea of Japan, off Inosima, in 345 fathoms.

690. SEBASTODES, Gill.

(ROCKFISHES.)

Sebastodes, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 165 (*paucispinis*).
Sebastichthys, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 329 (*nigrocinctus*).
Sebastosomus, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 147 (*melanops*).
Sebastomus, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 147 (*rosaceus*).
Acutomentum, EIGENMANN & BEESON, American Naturalist 1893, 669 (*ovalis*).
Primospina, EIGENMANN & BEESON, American Naturalist 1893, 669 (*mystinus*).
Pteropodus, EIGENMANN & BEESON, American Naturalist 1893, 670 (*maliger*).
Auctospina, EIGENMANN & BEESON, American Naturalist 1893, 670 (*auriculatus*).
Rosicola, JORDAN & EVERMANN, Check-List Fishes N. and M. A., 429, 1896 (*pinniger*).
Eosebastes, JORDAN & EVERMANN, Check-List Fishes N. and M. A., 430, 1896 (*aurora*).
Hispaniscus, JORDAN & EVERMANN, Check-List Fishes N. and M. A., 431, 1896 (*rubrivinctus*).
Emmelas, JORDAN & EVERMANN, new subgenus (*glaucus*).

Body and head somewhat compressed; head large, 2⅖ to 3⅔ in length of body;* depth 2¼ to 3¾ in length of body; mouth moderate or large, with the jaws equal or the lower more or less projecting; the maxillary reaching middle of eye or beyond, sometimes beyond posterior edge of orbit, its length from 1¾ to 3 in head; teeth in villiform bands on jaws, vomer, and palatines. Head more or less evenly scaled, without dermal flaps; interorbital space convex or concave, widening markedly with age; cranial ridges† more or less developed, one or more of the following pairs always

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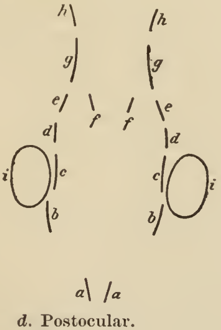
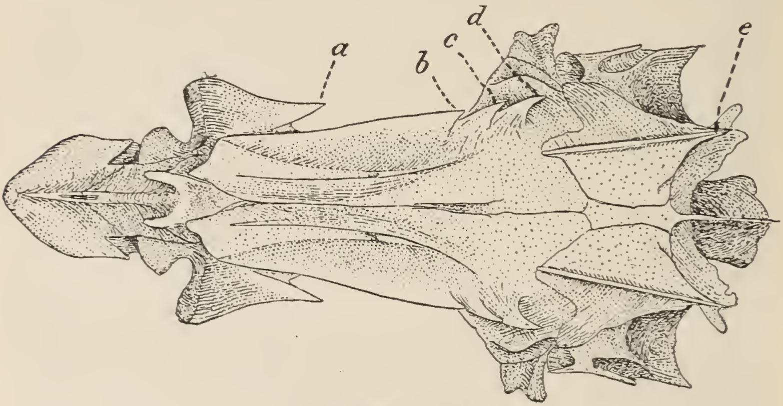
* The length of body in these descriptions is measured in the usual way, i. e., from tip of snout to base of caudal fin.

† *Diagram of cranial ridges of Sebastodes.*



a. Nasal.
b. Preocular.
c. Supraocular.
d. Postocular.
e. Tympanic.
f. Coronal.
g. Parietal.
h. Nuchal.
i. Eyes.

present, usually ending in spines: preocular, supraocular, postocular, tympanic, coronal, parietal, and nuchal. Five preopercular and 2 opercular spines; 1 to 3 spines on the suprascapula. Suborbital stay moderate, usually not reaching preopercle. Gill rakers various, from very long and slender to very short. Scales moderate or small, mostly ctenoid, 35 to 100 transverse series. Dorsal fin continuous, emarginate, its formula XIII, 12 to 16; anal fin III, 5 to 9. Pectorals well developed, the base broad or narrow, the lower rays undivided. Caudal slightly rounded, truncate, or slightly forked; soft parts of vertical fins more or less scaly. Pyloric cæca 6 to 11. Vertebræ 12 + 15. Species of varied, often brilliant colors, mostly red. Sexes colored alike. The group inhabits the two shores of the Northern Pacific Ocean; some of the species are extremely localized; exceedingly abundant in rocky places along the west coast of the United States. They seem to disappear rather abruptly to the south of southern California, and the number of species dwindles northward; none Arctic, the bulk of the group inhabiting temperate waters. The vertical range of most of the species is rather limited; some live in and near tide water, and a few species have been taken at a depth of 1,600 feet. All are ovoviviparous, bringing forth great numbers of young, which are nearly ½ inch in length when born. The species differ greatly in form and armature, and in the extension of the bones of the cranium, but the genera based on these differences intergrade too closely to admit of definition, notwithstanding the great differences which appear on comparison of extreme forms.



SEBASTODES ROSACEUS.

Spines: *a*, preocular; *b*, supraocular; *c*, postocular; *d*, tympanic; *e*, parietal.

The following detailed remarks on the osteology and relations of *Sebastodes* are taken from Cramer's memoir, "On the cranial characters of the genus *Sebastodes*:"[*]

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[*] Proc. Cal. Ac. Sci., series 2, Vol. v, 1895, 573–610, pls. 57–70; reprinted as Contributions to Biology from the Hopkins Seaside Laboratory, No. 11.

The characteristic spines and ridges are: The preocular on the anterior superior border of the orbit; the supraocular, near the edge of the frontal bone above the middle of the orbit; the postocular, behind the supraocular, and the tympanic, behind the postocular on the frontal bone near the superior posterior angle of the orbit; and the parietal, present in all the species, a longitudinal ridge on the middle of the parietal bone. Of these ridges all may be absent except the parietal, and in the different species in which they are present differ exceedingly in the degree of their development. The thickness of the bones of the skull is generally correlated with other characters, rather thin papery skulls bearing strongly developed bony ridges, while thicker and more bony skulls have the ridges low or obsolete. But there are several exceptions to the rule. Other characters at first seem important, but as they occur in a few species only, far apart in the series, they must be regarded as sporadic. Thus nuchal spines are present in *S. levis, chlorostictus, aurora,* and *constellatus* (in the last species connected with a tendency of the ridges to break up into spines and tubercles), but they are inconstant even in the species in which they occur, so that it is doubtful whether they are always present in any species. The coronal spines, likewise inconstant, are usually present in *S. aurora,* and nearly always present in *S. auriculatus.*

In some species in which pairs of spines are normally absent, these are sometimes present in a rudimentary or distorted form, either singly or in pairs. Although the *paucispinis* group is characterized by the absence of the usual pairs of spines in adults, 2 adult *paucispinis* skulls had a rudimentary supra- or post-ocular on the left side, and a very young skull of this division had rudimentary tympanic spines on both sides and a postocular on the left side; a medium-sized *melanops* had a rudimentary right tympanic; and a large one had a pair of postoculars and a deformed left supraocular; a young *flavidus* had a rudimentary right postocular; in an *elongatus,* in which the supraoculars are normally absent, the spines were still present in the form of low humps on the ridge; in another specimen the supraocular spine was sharp and perfectly distinct.

Hilgendorf expressed the belief that when 1 of the 3 pairs of spines (supraocular, postocular, and tympanic) is absent, it is the supraocular and not the postocular that has disappeared.* This is proved by several series of facts. When the 3 spines are present together, the distance from the base of the tympanic to the base of the supraocular on the one hand, and the distance from the supraocular to the preocular on the other hand, are to each other in many species as 1 to 1, varying from this ratio to 1 to 3 in *rosaceus;* while where 1 of the spines is absent, the relative distances vary from 3 to 10 to 3 to 15 (except *nebulosus,* 2 to 5). These measurements give the all but invariable rule that, when 1 of the spines is absent the so-called supraocular occupies the position of the postocular. When both the supraocular and postocular are present and

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*Hilgendorf: Uebersicht über die japanischen Sebastes-Arten, Sitzungs-Bericht der Gesellschaft Naturforschenden Freunde zu Berlin, 21. Dec., 1880, p. 168. "Das maximum von Dornen am Oberkopf kommt bei *S. marmoratus* vor, nämlich einer in der Nasengegend, der nasaldorn, drei auf dem Augenrand, Orbital-dornen, von denen der mittlere bei den andern Arten zuerst verschwindet."

differ in size (which is usually the case), the supraocular is invariably weaker than the postocular. The depression between the tympanic and postocular is always deep, while between the postocular and supraocular there is frequently a well-marked ridge (*chlorostictus, rhodochloris, ruberrimus*). In *levis* the true supraocular is usually present; in the skull at hand it was absent, but on one side a blunt knob occupied the position required by the rule of relative distances, and just behind this point, on both sides, there was a depression in the otherwise continuous ridge, marking the depression between the supra- and post-oculars. In the skull of *elongatus*, in which 1 of the pairs of spines is normally absent, there is a low, conical, rudimentary spine on the left side, occupying the position of the supraocular, as required by the rule of relative distances. These facts, taken together, seem to establish the conclusion that when 1 of the trio of pairs of spines is absent, the supraocular spine has disappeared, and the supraocular ridge merged with the postocular.

Of the changes that take place with increasing age, the following are among the most constant: The bones of the skull grow thicker and in very large specimens become spongy. The processes of the mesethmoid become depressed; and the ventral process of the basisphenoid, when present at all, sometimes suffers complete, and always partial absorption. The interorbital space grows relatively wider, this being one of the most striking and constant variations. The width of this space is always given as measured at its narrowest part (which usually falls immediately behind the preocular spines), and compared with the total length of the base of the skull. In a young *vexillaris*, the ratio of interorbital width into the length of the base of the skull is $5\frac{1}{4}$, in a medium-sized one $4\frac{8}{9}$, and in a large one 4. In a young *maliger* it is $4\frac{4}{5}$, in an old one $4\frac{1}{3}$; in a young *miniatus* $3\frac{4}{7}$, in an old one $3\frac{1}{11}$; in a young *flavidus* $3\frac{7}{15}$, in an old one 3. In a very young *ruberrimus* it is $6\frac{4}{7}$, in one 2 or 3 times as large $5\frac{2}{7}$, in one in which the cranial ridges are almost completely serrated 5, and in a very large old specimen $4\frac{5}{22}$.

It will be seen from the key given below that in several parts of the group closely related species have the parietals in contact; but while this serves well as a character of subordinate importance, the mere fact that any 2 species have parietals which meet or overlap is no proof of affinity unless it is supported by other agreements. The most reliable cranial characters for the purpose of classification of the species are: The degree of curvature of the base of the skull; the convexity or concavity of the interorbital space and its relative width; the direction of the mesethmoid processes; the degree of development of the ventral process of the basisphenoid, and the strength or weakness of the cranial ridges. These characters are closely correlated, and furnish the only basis for the arrangement of the species within the genus. In the *paucispinis, melanops,* and *pinniger* groups (see classification below) the base of the skull is strikingly curved; the interorbital space is always convex (at most flat, never concave) and relatively wide, its width never being more than $3\frac{1}{2}$ in the length of the base of the skull; the mesethmoid processes are never directed upward; the ventral process of the basisphenoid is absent, or reduced to a mere point, or at most occasionally present in very young specimens; the cranial ridges are poorly or not at all developed, and the spines are delicate or absent. In the *rosaceus-nebulosus* groups the base of the skull is straight or nearly so; the interorbital space is always concave and narrow, its ratio in the base of the skull varying from $4\frac{1}{4}$ to $6\frac{4}{7}$; the mesethmoid processes are always directed more or less upward; and the ventral process of the basisphenoid, the cranial ridges and the spines are strongly developed.

These 2 groups of characters would furnish an ample basis for the division of the genus into 2, if the species mentioned were alone to be considered. But between the 2 groups distinguished by these characters lies another (*introniger-aurora*) in which the base of the skull is somewhat curved (approaching straightness), the interorbital space is flat or slightly concave, of medium width, 4 to $4\frac{1}{2}$ into the base of the skull, the processes of the mesethmoid are directed but little upward and the ventral process of the basisphenoid is poorly developed. By the interposition of this group it is possible to arrange a series from *paucispinis* to *rosaceus* in which there is an almost perfect gradation of all the above-mentioned characters, from strikingly curved to straight base of skull, from convex and broad to concave and narrow interorbital space, from mesethmoid processes depressed to those directed 45° above the dorsal plane of the skull, from a rudimentary to a fully developed ventral process of the basisphenoid, and from nearly obsolete to strongly developed cranial ridges.

The single species *ruberrimus* furnishes at different stages in its development a series of characters that parallel in a striking way the series just described. The very young skull is so much like those of *rosaceus* and *rhodochloris* that, if it were the only *ruberrimus* at hand, it might easily be put between them in a series. The width of the interorbital space is $6\frac{4}{7}$ into the base of the skull, relatively narrower than that of any other skull in the collection of 50, and deeply concave; the mesethmoid processes are directed upward and the ventral process of the basisphenoid is well developed. The very large skull of the same species is almost exactly adapted to the description of the *aurora-introniger* group. The interorbital space is perfectly flat and $4\frac{5}{22}$ into the base of the skull, the mesethmoid processes extend forward nearly horizontally and the ventral process of the basisphenoid is rudimentary. The gap between these two extremes is completely closed by skulls of intermediate age.

S. saxicola and *diploproa* constitute another intermediate group with the base of the skull markedly curved, the interorbital space slightly convex or flat, of medium width, $3\frac{3}{4}$ to $4\frac{1}{4}$ into the base of the skull, mesethmoid processes directed but little upward, and the ventral process of the basisphenoid rudimentary or fairly developed. This intermediate group, unlike the other, lacks the supraocular spine and probably forms one of the links between the *entomelas-pinniger* group and the other rockfish in which the supraocular is wanting.

The following classification (containing most, but not all, of the species), based exclusively on cranial characters, summarizes what has been said and includes some details not hitherto mentioned:

a. Base of skull markedly curved. Interorbital space convex or flat, broad, less than 3½ in the base of the skull. Processes of mesethmoid not directed upward. Ventral process of basisphenoid rudimentary. Cranial ridges obsolete or weak, spines absent or delicate.

b. Cranial ridges (except parietal) obsolete or very slightly developed. Cranial spines absent or very inconstant and weakly developed.

c. Parietals not meeting; mesethmoid processes weak and depressed; skull moderately thick; parietal ridges weak, with minute spines or none; other ridges none.

d. Interorbital space plainly convex. PAUCISPINIS.

dd. Interorbital space nearly flat. JORDANI; GOODEI.

cc. Parietals meeting in the middle line, but separated posteriorly by a wedge-shaped exposure of the supraoccipital. Mesethmoid processes better developed, straight, and horizontal; skull thick, the bones striated; parietal ridges low, spineless, other ridges none.

e. Preocular spines none. FLAVIDUS; MELANOPS.

ee. Preocular spines present. MYSTINUS.

bb. Cranial ridges somewhat developed; preocular, supraocular, postocular, tympanic, and parietal spines present, all delicate; ventral process of basisphenoid sometimes present in young. (Tympanic spines usually absent or imperfect in *atrovirens*.)

f. Parietals not meeting; interorbital space usually plainly convex; bones thick, more or less striated.

g. Supraocular spine present.

h. Base of skull strikingly curved; parietals nearly meeting. ENTOMELAS; OVALIS; HOPKINSI.

hh. Base of skull less strikingly curved; parietals well separated.

i. Interorbital plainly convex. PINNIGER.

ii. Interorbital space flat, or nearly so. MINIATUS.

gg. Supraocular spine absent; parietals well separated; interorbital space but little convex; mesethmoid processes directed somewhat upward. ATROVIRENS.

aa. Base of skull markedly curved. Interorbital space flat or slightly concave, of medium width, 3¾ to 4¼ in base of skull. Processes of mesethmoid directed but little upward. Ventral process of basisphenoid rudimentary or fairly developed.

j. Cranial ridges fairly developed; supraocular spines absent; skull thin, papery; mesethmoid processes horizontal.

k. Parietals not meeting. SAXICOLA.

kk. Parietals meeting. DIPLOPROA.

aaa. Base of skull nearly straight (slightly curved). Interorbital space flat or slightly concave, of medium width, 4 to 4½ in base of skull. Processes of mesethmoid directed but little upward. Ventral process of basisphenoid rudimentary or poorly developed. Cranial ridges and spines quite strong.

l. Cranial ridges well developed. Preocular, supraocular, postocular, tympanic, parietal and nuchal spines present; coronal spines usually present. INTRONIGER; AURORA; MELANOSTOMUS.

aaaa. Base of skull straight, or nearly so. Interorbital space concave and narrow, 4¼ to 6$\frac{4}{7}$ in base of skull. Processes of mesethmoid directed upward. Ventral process of basisphenoid well developed. Cranial ridges high and strong.

m. Supraocular spine present. Parietals not meeting.

n. Skull thick; cranial ridges broken into tubercles and spines; interorbital space flat; mesethmoid processes horizontal; ventral process of basisphenoid rudimentary in adult (the skull of young almost exactly as in *rosaceus;* see below). RUBERRIMUS.

nn. Skull somewhat papery; ridges smooth; interorbital space concave; mesethmoid processes directed upward; ventral process of basisphenoid well developed in both young and old. CONSTELLATUS; ROSACEUS; RHODOCHLORIS; CHLOROSTICTUS; RUPESTRIS.

mm. Supraocular spine absent.

- *o.* Interorbital space not widening markedly backward.
  - *p.* Parietals not meeting; skull papery. ELONGATUS.
  - *pp.* Parietals meeting; skull bony.
    - *q.* Nuchal spines none. RUBRIVINCTUS; LEVIS.
    - *qq.* Nuchal spines present; ridges thick and high. SERRICEPS; NIGROCINCTUS.
- *oo.* Interorbital space widening markedly backward; parietals not meeting.
  - *r.* Coronal spines present; skull bony. AURICULATUS.
  - *rr.* Coronal spines none.
    - *s.* Skull thick; bones striated; interorbital space slightly convex. RASTRELLIGER.
    - *ss.* Interorbital space concave and the cranial ridges strong and high. VEXILLARIS; MALIGER; CARNATUS; CHRYSOMELAS; NEBULOSUS; GILBERTI.

The interorbital space becomes more concave and narrower and the ridges stronger and higher from the beginning to the end of the series.

Messrs. Eigenmann & Beeson have attempted to subdivide this genus into several on the basis of cranial characters. Mr. Cramer has given in detail in the paper above quoted his reasons for rejecting these proposed genera and for reverting to the sequence of species in Jordan & Gilbert's Synopsis. The character especially put forward by Eigenmann & Beeson, that of the contact (not union) of the parietals, seems to us of very slight value, even as a specific distinction.

The following is the analysis of genera of Sebastinæ given by Eigenmann & Beeson.*

SEBASTINÆ:

- *a.* Vertebræ 27 or more.
  - *b.* Dorsal spines 14 to 16; the lower pectoral rays thickened, unbranched, and produced; ventrals directly under pectorals. Suborbital stay strong, spiniferous. SEBASTOLOBUS.
  - *bb.* Dorsal spines 13; vertebræ 27.
    - *c.* Palatines with teeth. Lower pectoral rays unbranched, their tips projecting.
      - *d.* Parietals meeting above the supraoccipital,† except sometimes in *Primospina*.
        - *e.* Jaws equal; head narrow above; high and prominent cranial keels ending in spines. Preocular, supraocular, tympanic, and parietal present: Gill rakers usually short, spatulate or clavate, their broadened tips spiniferous. Scales usually very strongly ctenoid; accessory scales numerous; suborbital stay directed obliquely downward and backward; second anal spine much heavier than and at least as long as third. Body short and deep, back arched, mouth very large but rather narrow, head heavy. Inter and sub opercle without spine. Branchiostegals and lower jaw naked. Three or 4 large pores along each ramus of the lower jaw. Species usually with cross bands. SEBASTICHTHYS.

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* Proc. U. S. Nat. Mus., XVII, 1894, 375–407.

† See *Sebastomus æreus* and *elongatus*.

ee. Lower jaw much projecting; head broad, skull usually convex; cranial ridges when present usually low. Gill rakers very long and slender; scales usually smooth, few, if any, accessory scales. Branchiostegals and lower jaw scaled. Pores of lower jaw concealed except in some species of *Acutomentum.*

f. Preocular spines well developed. Peritoneum black.

g. Postocular spine present. Supraocular, tympanic, and occipital spines well developed. Second anal spine stronger and usually longer than the third. Symphyseal knob strong, projecting forward. Dorsal low. Lower pectoral rays normal, not thickened. No spines on inter- and subopercles. (Mandible and maxillary scaled.) ACUTOMENTUM.

gg. Postocular spines not developed. Supraocular and tympanic sometimes present, always concealed by the skin. Occipitals ending in spines or not. Interorbital wide, convex. Lower pectoral rays thickened, their tips projecting beyond the membrane. Bones of the skull striate and pitted. Mouth small, narrow. Spines on inter- and subopercle sometimes present. Peritoneum black. PRIMOSPINA.

ff. Preocular without spine; skull smooth, without spines. Lower pectoral rays normal. No spines on inter- or subopercle. Peritoneum usually white. SEBASTOSOMUS.

dd. Parietals separated by the supraoccipital.*

h. Cranium with parietal ridges only. Lower jaw much projecting, entering the profile; a prominent symphyseal knob directed forward. Head broad, convex. Interorbital convex, nearly smooth. Lower pectoral rays normal; no spines on inter- and subopercle. Exposed branchiostegals, maxillary, and mandibles densely scaled. Pores of lower jaw concealed by the scales. SEBASTODES.

hh. Cranium with many ridges, all ending in spines. Branchiostegals (except in *A. aurora*, *S. proriger*, and *S. rufus*) and usually the lower jaw naked. Pores of lower jaw, except in *Auctospina*, very large, conspicuous, slit-like.

i. Postocular and tympanic spines both present. Lower pectoral rays thickened (except in *Sebastomus rufus*). Interopercle and subopercle usually with spines.

j. Coronal and nuchal spines present; a spine below, another in front of eye. (———).

jj. Coronal spines not developed. SEBASTOMUS.

ii. Postocular spine not developed; interopercle and subopercle each with a spine at their approximated corners.

k. Coronal spines not developed; lower pectoral rays usually thickened; interorbital usually with a groove in its middle. The large pores (4) along each ramus of the lower jaw open. Maxillary, mandible, and branchiostegals usually naked or with minute embedded scales. PTEROPODUS.

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* Except in *æreus* and sometimes in *elongatus.*

kk. Coronal spines developed; interorbital with a median ridge; gill rakers long; lower pectoral rays normal, not thickened and fleshy. Pores of lower jaw (in *auriculatus*) entirely closed by a thin membrane. AUCTOSPINA.

cc. Palatines without teeth. Preocular, supraocular, postocular, tympanic, parietal, nuchal, and coronal spines developed. Suborbital stay with a sharp spiniferous ridge. SEBASTOPSIS.

About 12 or 15 species * of *Sebastodes* have been described from the waters of Japan, and about 55 species from the Pacific coast of North America. Thus far none has been found common to both coasts of the Pacific. There is proof that at least 3 species inhabit the west coast of South America. In view of the fact that nearly all the species of this genus have been discovered during the last 15 years, that there are strong indications that the coasts of Japan and temperate South America may contain nearly as great a variety of forms as has been brought to light on the coast of America, and that the range of known species is likely to be greatly extended, it has been thought proper to append in footnotes the diagnoses of all the known species of this remarkable genus. (*Sebastes;* εἶδος, resemblance.)

ANALYSIS OF NORTH AMERICAN SPECIES OF SEBASTODES.

EMMELAS (ἐν, in; μέλας, black):

I. Dorsal spines 14; skull thick, with small spines; colors dull. GLAUCUS, 2177.

II. Dorsal spines always 13.

a. Interorbital space more or less convex (never concave), broad, less than 3½ in base of skull; cranial ridges very low or obsolete, the spines, when present, delicate; base of skull strongly curved, mesethmoid processes not elevated (not directed upward), ventral process of basisphenoid rudimentary (or fairly developed only in young); skull usually thick; anal rays III, 9 to III, 6; gill rakers usually long and slender; snout, preorbitals, and jaws more or less scaly.

b. Cranial ridges (except parietal) all obsolete or very slightly developed, cranial spines absent or very inconstant and minute (regularly present only in young), (preocular spines usually present in *mystinus*); lower jaw much projecting.

SEBASTODES:

c. Parietal bones not meeting; mesethmoid processes weak and depressed; scales small, 90 to 100 transverse series of scales above lateral line, 55 to 80 tubes; lower jaw much projecting, entering profile, a large symphyseal knob, directed forward. A. III, 8 to III, 10.

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* A fossil species is referred to this genus, viz: *Sebastodes rosæ*, Eigenmann, known from a fragment found at Port Harford, California. It is thus described:

"*Sebastodes* (?) *rosæ*, EIGENMANN, Zoe, I, 16, 1890.

"During half an hour's search in a bed of Tertiary fossils at Port Harford, California, a comparatively large number of fish remains were discovered. They consisted mostly of isolated, and in many cases fragmentary, bones, mixed with the remains of mammals, birds, crustaceans, radiates, and mollusks.

"Among the fish remains is the lower of the preopercle of a *Sebastodes*, or some related genus. It represents a fish about 0.30 m. long. The 3 lower preopercular spines are of about equal size and the distance between them is about equal. They are all directed downward and backward. The ridge between the exposed portion of the limb and that portion serving for the attachment of the muscles of the cheek is less marked than in living species, and the latter surface is shallower and broader. Compared with living species of *Sebastodes* this species most resembles *rosaceus;* the preopercle is, however, much heavier. The openings into the mucous canal differ from all living species very strikingly. There are 3 such openings, or pits, on the anterior half of the first spine, decreasing in size backward (the posterior is quite small and not in view in the accompanying figure). There is a large pit between the first and second, and another between the second and third spines, and 2 smaller ones on the anterior half of the second spine. The species may stand as *Sebastodes* (?) *rosæ*." (Eigenmann.)

d. Peritoneum wholly black; body very slender, the depth 4 in length; coloration silvery olive or red; skeleton rather flexible. A. III, 9 or 10; scales 55, gill rakers $x+29$. JORDANI, 2178.

dd. Peritoneum white or with dark dots; depth about 3⅔ in length; skeleton firm.

e. Anal rays III, 8; pores of lateral line about 55; gill rakers $x+25$: dusky olivaceous above, silvery on sides, more or less flushed with red. GOODEI, 2179.

ee. Anal rays III, 9; tubes of lateral line 65 to 80; color light olivaceous red; young olivaceous, somewhat mottled. PAUCISPINIS, 2180.

cc. Parietal bones usually meeting; mesethmoid processes better developed, straight, not elevated.

SEBASTOSOMUS (*Sebastes; σῶμα*, body):

f. Peritoneum white; dorsal fin deeply emarginate.

g. Anal rays III, 9.

h. Pectorals reaching tips of ventrals, but not quite to vent; olivaceous; caudal yellowish green. FLAVIDUS, 2181.

hh. Pectorals not reaching tips of ventrals, not nearly to vent; gray of varying shades, the back darker; a series of large white blotches along sides of back much more marked in some than in others; fins yellowish. SERRANOIDES, 2182.

gg. Anal rays III, 8; color dusky, sides spotted with black; caudal dark. MELANOPS, 2183.

PRIMOSPINA (*primus*, first; *spinus*, spine):

ff. Peritoneum black; colors dusky, fins blackish, dorsal fin not very deeply emarginate.

i. Anal rays III, 8; preocular ridges obsolete, frontal region between them not specially convex: color greenish, speckled with olive. CILIATUS, 2184.

ii. Anal rays III, 9; preocular ridges present, usually ending in spines, frontal region between them bulging; color blackish. MYSTINUS, 2185.

bb. Cranial ridges somewhat developed, preocular, postocular, tympanic, and parietal spines usually all present, delicate (supraocular also present in some species; tympanic usually absent in *atrovirens*); lower jaw projecting; parietal bones usually not meeting.

ACUTOMENTUM (*acutus*, acute; *mentum*, chin):

j. Lower jaw much projecting; scales rather small; lateral line 50 to 75; anal rays III, 7, to III, 9; dorsal fin not deeply emarginate, soft dorsal low.

k. Second anal spine scarcely or not longer, usually shorter, than third.

l. Supraocular spine wanting; color creamy olivaceous; peritoneum black. ENTOMELAS, 2186.

ll. Supraocular spine usually present.

m. Peritoneum black.

n. Anal rays III, 8; compressed, elongate; rufous, variously marked with brown. RUFUS, 2187.

nn. Anal rays III, 7; elongate; head pointed; mostly black above, lateral line vermilion, black band below it. MACDONALDI, 2188.

mm. Peritoneum white. BREVISPINIS, 2189.

kk. Second anal spine notably longer than third; peritoneum black.

o. Supraocular spines usually present.

p. Body rather ovate, the depth less than 3 in length.

q. Lateral line about 70; color chiefly creamy. OVALIS, 2190.

qq. Lateral line about 43; color darker. EIGENMANNI, 2191.

pp. Body elongate; depth more than 3; pores of lateral line 50 to 52.

r. Pectorals not reaching vent; A. III, 7; color creamy with dark bands; spines on head very weak, often absent. HOPKINSI, 2192.

rr. Pectorals reaching vent; A. III, 8; dusky above, with faint traces of darker blotches along back. ALUTUS, 2193.

oo. Supraocular spines absent, body rather elongate; A. III, 7; color chiefly red. PRORIGER, 2194.

ROSICOLA (*roseus*, red: *colo*, to inhabit; living in the zone of red algæ):

jj. Lower jaw little projecting; scales moderate, lateral line 45 to 55; A. III, 7, or III, 6.

s. Supraocular spine present; A, III, 7: color red.

t. Scales on mandible smooth; color chiefly orange. PINNIGER, 2195.

tt. Scales on mandible very rough; color chiefly brick red.

u. Color above, deep vermilion, mottled with flesh color on sides; belly light red.

v. No spines below eye. MINIATUS, 2196.

vv. Spines present below eye. ALEUTIANUS, 2197.

uu. Color reddish orange, much mottled on back and upper part of sides with dark brown. ATRORUBENS, 2198.

ss. Supraocular spine wanting; interorbital space but little convex; mandible with a few smooth scales; color olivaceus. A. III, 6; tympanic spine usually absent. ATROVIRENS, 2199.

EOSEBASTES (ἠώς, dawn; *Sebastes*):

aa. Interorbital space flat or slightly concave, of medium width; mesethmoid processes but little or not at all elevated, ventral process of basisphenoid rudimentary. Cranial ridges and spines moderately strong. Lower jaw moderately or not much, sometimes not at all, projecting; gill rakers usually long and slender; A. III, 6, to III, 8. Deep-water species.

w. Base of skull strongly curved, supraocular spine absent.

x. Parietals not meeting, lower jaw somewhat projecting.

y. Gill rakers 10 + 22; dark bars on sides faint, becoming obsolete with age. SAXICOLA, 2200.

yy. Gill rakers 10 + 21, slender, 2⅓ in orbit; no distinct dark cross bars. CRAMERI, 2201.

yyy. Gill rakers 10 + 27; 2 dark half bars on side conspicuous and persistent. SEMICINCTUS, 2202.

xx. Parietals meeting; premaxillaries with prominent dentigerous knobs, between which the tip of lower jaw fits. DIPLOPROA, 2203.

ww. Base of skull nearly straight; supraocular spine present, quite strong; coronal and nuchal spines usually present.

z. Second anal spine much longer and stronger than third. A. III, 6; pores of lateral line about 29. AURORA, 2204.

zz. Second anal spine little or not at all longer than third. A. III, 7 or 8. Mouth and gill cavities more or less black. MELANOSTOMUS, 2205.

zzz. Second anal spine equaling third in length. A. III, 7. Lining of mouth and gill cavity largely black. INTRONIGER, 2206.

aaa. Base of skull straight or nearly so; interorbital space as a rule concave and narrow; the cranial ridges and spines well developed. Mesethmoid processes directed upward; ventral process of basisphenoid well developed; skull comparatively thin. Gill rakers usually short.

SEBASTOMUS (*Sebastes*; ὦμος, shoulder):

a′. Supraocular spine present; interorbital space concave.

b′. Second anal spine scarcely longer than third; color red, nearly plain. Cranial ridges broken and armed with accessory spines; interorbital space nearly flat in adult (ridges smooth, interorbital space concave in young, as in *Sebastodes rosaceus*). RUBERRIMUS, 2207.

bb′. Second anal spine much longer, usually stronger, than third. Cranial ridges smooth.

c′. Color more or less rosy, with 3 to 5 round blotches of pink on sides of back.

d′. Dorsal spines usually low, the highest less than ½ the length of head; no small green spots on sides of back.

e′. Body everywhere with small round pale spots. CONSTELLATUS, 2208.

ee′. Body without stellate spots.

f′. Second anal spine longer than third.

g′. Mandible scaly; the 5 large pink blotches washed with orange; general color light orange, overlaid with blackish; interorbital space rather broad. UMBROSUS, 2209.

gg′. Mandible naked; pale blotches on sides surrounded by purple shades: head with purplish above.

h′. Supraorbital ridge rather high, with spines. ROSACEUS, 2210.

hh′. Supraorbital ridge lower, thicker, and without spines. AYRESI, 2211.

ggg′. Mandible partly scaly; second anal very long; cranial ridges very sharp; pale blotches on sides surrounded by green shades, no purple, RHODOCHLORIS, 2212.

gggg′. Mandible and maxillary scaly; dorsal rather high; interorbital flattish with deep median groove; pale blotches washed or faded. EOS, 2213.

ff′. Second anal spine about as long as third; mandible naked; no symphyseal knob. GILLI, 2214.

dd′. Dorsal spines very high, the highest ½ the length of head; body above with many small round green spots. Second anal spine much longer than third; mandible naked. CHLOROSTICTUS, 2215.

cc′. No round blotches of pink on sides of back. Nuchal spines present. RUPESTRIS, 2216.

HISPANICUS (Ἱσπανία, Spain; ἱσπανὸς, Spaniard; Spanish flag):

aa′. Supraocular spine wanting.

i′. Mandible scaly; peritoneum dusky or black.

j. Lower jaw only slightly or not at all projecting: peritoneum jet-black.

k′. Mouth and gill chamber jet-black. D. XIII, 12, A. III, 5. Lower jaw not projecting. SINENSIS, 2217.

kk′. Roof of mouth posteriorly dusky, buccal and branchial cavities otherwise white; lower jaw a little projecting. D. XIII, 14 or 15; A. III, 7 or 8. ZACENTRUS, 2218.

jj′. Lower jaw much projecting; sides above with irregular horizontal interrupted olive-green bands; peritoneum dusky. D. XIII, 13; A. III, 6. ELONGATUS, 2219.

ii′. Mandible naked; peritoneum pale or white. Body usually deep.

l′. Scales on head mostly cycloid; lower jaw projecting; head large, pointed.

m′. Second anal spine 4½ in head; color pink, with 4 interrupted cross bars of black; back sometimes dusky. LÆVIS, 2220.

mm′. Second anal spine 2½ in head, much stronger than third; color pinkish white, banded with deep crimson. RUBRIVINCTUS, 2221.

ll′. Scales on head ctenoid; lower jaw usually included; second anal spine little enlarged.

n′. Nuchal spines none. Body not barred with black. Interorbital space widening markedly from before backward.

AUCTOSPINA (*auctus*, self; *spina*, spine):

o′. Coronal spines usually present; color brownish, mottled. AURICULATUS, 2222.

oo′. Coronal spines none; ridges with entire edges.

PTEROPODUS (πτερόν, wing; πούς, foot):

p′. Gill rakers extremely short, most of them as wide as high; general color dusky greenish. RASTRELLIGER, 2223.

- *pp'*. Gill rakers higher than wide.
  - *q'*. Highest dorsal spine notably more than $\frac{1}{2}$ length of head.
    - *r'*. Head and upper parts not speckled with orange; membrane of spinous dorsal not very deeply incised.
      - *s'*. Color dark brown, varied with light brown; dorsal spines moderate. CAURINUS, 2224.
      - *ss'*. Color reddish, varied with yellowish; dorsal spines extremely high. VEXILLARIS, 2225.
    - *rr'*. Head and upper parts everywhere speckled with orange; front of back yellowish; soft fins black; dorsal spines extremely high, their membranes deeply incised. MALIGER, 2226.
  - *qq'*. Highest dorsal spine little, if any, more than $\frac{1}{2}$ the length of head.
    - *t'*. Pale blotches on sides not forming a continuous lateral band; parietal ridges moderate.
      - *u'*. Pale markings brick red, dark markings blackish; dorsal membrane very deeply incised. GILBERTI, 2227.
      - *uu'*. Pale markings flesh color; dark markings olivaceous. CARNATUS, 2228.
      - *uuu'*. Pale markings yellow; dark markings blackish. CHRYSOMELAS, 2229.
    - *tt'*. Pale blotches on sides forming a continuous lateral band; body and fins profusely speckled with pale; dark markings black; pale markings yellow; parietal ridges very strong. NEBULOSUS, 2230.

SEBASTICHTHYS (*Sebastes*; *ἰχθύς*, fish):

- *nn'*. Nuchal spines present, sometimes coalescent with parietals; cranial ridges high, arranged nearly in a right line on each side of the narrow top of head; body with black cross bars, some red, at least on head.
  - *v'*. Cranial ridges with their edges entire; color olivaceous, with black cross bands, the red chiefly confined to the jaws. SERRICEPS, 2231.
  - *vv'*. Cranial ridges with the surface broken, spinous; frontal ridges elevated; color bright red, with black bands overlaid by red. NIGROCINCTUS, 2232.

Subgenus EMMELAS, Jordan & Evermann.

2177. SEBASTODES GLAUCUS (Hilgendorf).

Head $3\frac{1}{3}$ in length; depth $2\frac{3}{4}$; eye $4\frac{3}{8}$ in head, $1\frac{1}{5}$ in snout; interorbital width $3\frac{3}{5}$ in head. D. XIV, 16; A. III, 8. Lateral line with 56 pores. Highest dorsal spine $2\frac{1}{3}$ in head, thirteenth spine $4\frac{2}{5}$, fourteenth spine $3\frac{3}{8}$; second anal spine $3\frac{4}{5}$, third anal spine $3\frac{1}{5}$, longest soft ray of dorsal $1\frac{9}{10}$. Crown and occiput very broad, more convexly arched than in any other species known to us. Nasal spines low, but strong. Ocular ridge low, evident only above front of eye; occipital ridges barely evident, evenly scaled over; top of head otherwise without spines, ridges, or furrows, the even convex curve unbroken. Vertical distance from middle of interorbital space to upper edge of orbit equalling $\frac{1}{2}$ vertical diameter of orbit. Anterior margin of preorbital with 2 rounded lobes which do not bear spinous points; preopercular spines very strong, the upper 2 closely approximate, the others widely separated, all the spines sharp pointed, the uppermost very wide at base, the second much narrower, the others short and wide; upper 2 spines directed backward, the 3 lower downward and backward; opercular spines strong, flat, often bifid or trifid; spines on adjacent angles of subopercle and interopercle sometimes bifid; behind these on margin of subopercle a few short spinous points. Gill rakers very long and slender. 11+29 in number. the anterior 1 or 2 of lower arch tubercular, the longest (22 mm.) more than ⅔ diameter of orbit. Mandible very heavy, the symphysis not produced, the 2 jaws subequal. Vomerine and palatine patches of teeth extremely narrow. Fins high. the third to seventh dorsal spines subequal; caudal very slightly emarginate; anal spines graduated; pectorals scarcely reaching vertical from vent, the lower 9 simple, the 10 upper forked; ventral not reaching vent, ⅔ length of head. Caudal scaled to tip on membranes and rays; soft dorsal and anal with narrow bands of scales following the rays to or nearly to their tips, the membranes of the first 3 or 4 rays in each fin wholly scaled on basal third; spinous dorsal naked; pectorals scaled on basal half; ventrals naked; head, the maxillary and mandible, the branchiostegal rays, the anterior and upper half of interopercle, and all of preorbital except a minute area along its posterior margin, naked. The body is covered with small weakly ctenoid scales, largely covered over by the extraordinarily developed accessory scales; scales on breast, belly, and prepectoral area smooth. The naked skin covering bones of head is minutely wrinkled or papillose. Color in spirits, light brownish on body and fins, with darker shades on lips, gill membranes, opercles, and top of head; it may have been reddish in life; mouth and gill cavity white; peritoneum jet-black. One specimen 49 cm. long, from Bering Island. The identification is made with some doubt, owing to lack of any detailed description of the type, a dried specimen from Yesso, and to some minor discrepancies between the two. Our specimen has 56 (not 49) tubes in the lateral line, the nasal spine is small but not properly to be called rudimentary, the dorsal notch seems somewhat deeper, and the second anal spine somewhat shorter. North Pacific; coasts of Japan and Bering Island. (*glaucus*; γλαυκός, hoary blue.)

Subgenus SEBASTODES.

2178. SEBASTODES JORDANI, Gilbert.

D. XIII, 14 or 15; A. III, 9 or 10. Pores in lateral line 54 to 58. Maxillary reaching vertical from middle of eye, 2½ in head; snout 3⅚ in head; interorbital width 4⅗; eye large, 3⅚. Body very slender, the depth 4 in the length; the least depth of caudal peduncle ¾ diameter of eye; head very slender, 2⅘ in length, tapering regularly to the very sharp snout. Mandible projecting, its tip entering profile, provided with a rather small but distinct symphyseal knob. Interorbital width flat or slightly convex, wholly scaled over, the orbital ridges obsolete or a faint trace only of the supraorbital, which is always without spine; occipital ridges are low and sharp, terminating each in a spinous point. In addition to these, the tympanic spines are sometimes weakly developed, and the nasal spines are present; head otherwise wholly smooth; preorbital very narrow below eye, wide anteriorly, without distinct lobes, but with 1 or 2 weak spinous points; gill rakers long and very slender, 29 present on horizontal limb of outer arch, the longest equaling ½ diameter of orbit; preopercular spines 5, comparatively slender, all directed backward; dorsal spines very slender, the fourth the longest, or the fourth and fifth equal, contained 2⅔ to 2¾ in length of head; dorsal very deeply notched, the twelfth spine but ¼ as long as the longest, and barely connected at base with the eleventh; soft dorsal scarcely as high as the spinous; first anal spine very short, the second very slightly stronger than the third, and nearly or quite as long measured from base, its length 3½ in head; the second spine appears much shorter than the third when the fin is declined; longest soft ray of anal 2⅔ in head; caudal deeply notched. Anus anterior in position, midway between first anal spine and base of ventrals; tips of ventrals extending to or beyond it, and the pectorals extending beyond tips of ventrals. Scales small, everywhere ctenoid, entirely covering head, including maxillaries, mandibles, and snout, except a triangular area on top of snout, beneath which lie the premaxillary spines. Color as in *Sebastodes goodei*, dusky olive above, bright silvery on sides of head and body, and below; probably with some red in life; fins unmarked; mouth and gill cavities pure white, the peritoneum jet-black. Skeleton comparatively flexible as in deep-water fishes. Length 9 inches. Most nearly allied to *Sebastodes goodei*, from which it differs in the much slenderer body, the longer anal spines, the black peritoneum, and the more numerous gill rakers. From *S. entomelas* and *ovalis* this species differs in the obsolescence of the cranial ridges, as well as in other details. (Gilbert.) This species stands at one extreme of this genus as *Sebastodes nigrocinctus* stands at the other. Neither type represents the primitive stock, and it may be, as Dr. Eigenmann has suggested, that *Sebastodes mystinus* is the species nearest the primitive type from which the *Loricati* are all descended. (Named for David Starr Jordan.)

Sebastodes jordani, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 466, coast of California at Albatross stations 2935, 3103, and 3114, 32° to 37° N., in 62 to 124 fathoms.

2179. SEBASTODES GOODEI, Eigenmann & Eigenmann.

Head 2⅘; depth 3⅔; eye 3⅗ in head. D. XIII, 14; A. III, 8; lateral line 55 (pores), about 90 transverse series above lateral line. Body very slender, with narrow constricted caudal peduncle, sharp snout, and much projecting lower jaw, the latter well entering profile and furnished with symphyseal knob. Eye moderate, slightly longer than snout; maxillary reaching slightly beyond middle of orbit, 2⅓ in head; least depth of caudal peduncle less than diameter of orbit; preorbital narrow, its least width ⅖ pupil, with a minute spine or none. Nasal spine obsolete. Top of head smooth. Interorbital width 4¼ in head; preorbital region not prominent; all but the parietal ridges scaled over; preopercular spines flat, sharp, all directed backward, the second and third equal, the others shorter; opercular and suprascapular spines well developed. Gill rakers long and slender, about 25 on anterior limb of arch, the longest ½ length of orbit. Dorsal spines low and slender, the longest about 2⅔ in head, the twelfth ½ height of thirteenth, the latter about ½ height of soft rays, which are lower than the spines. Caudal forked for ⅓ its length. Anal very small, the spines short but strong, graduated, the second stronger and slightly shorter than third, its length ½ orbit. Soft anal rays low, their height ¼ head; pectoral not reaching vent, 1⅔ in head, projecting beyond tips of ventrals. Scales rough-ctenoid, completely investing head and body, including maxillaries, mandible, and outer branchiostegal rays. Gill rakers 10 or 11 + 23 to 25. In 3 young specimens the occipital spines are evident, the others concealed or not developed. The young show 5 dusky bars downward from back, under front, middle, and end of spinous dorsal, below soft dorsal, and on caudal peduncle. The head is contained 2⅔ times in the length; the depth 3⅗. The second anal spine is as long as the third, but does not reach its tip when fin is declined. Dusky olivaceous above, silvery on sides and below, more or less flushed with red; spinous dorsal somewhat dusky, vertical fins otherwise yellowish, without distinctive markings; lining of mouth and gill cavity white; peritoneum white, with small scattered black stellate spots, and more or less clouded with minute specks. Bones of skull moderately thick; cranial ridges (except parietals) and spines obsolete, occasionally a minute tympanic or parietal spine present; parietal ridges low but distinct, parietal bones widely separated, interorbital space nearly flat (slightly convex), broad, very nearly 3 in base* of skull; ventral process of basisphenoid rudimentary, mesethmoid processes weak, flat, depressed, base of skull (parasphenoid) markedly curved. Length 18 inches. San Diego to San Francisco. Here described from specimens from Albatross Station, 2949, off Santa Barbara Islands, in 155 fathoms. The species is now taken in abundance about the Coronados Islands, Santa Calalina, and the Cortez Banks. (Named for Dr. George Brown Goode.)

Sebastodes goodei, EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci. 1890, 12, San Diego. (Coll. C. H. Eigenmann.)
Sebastichthys goodei, GILBERT, Proc. U. S. Nat. Mus. 1890, 75.

2180. SEBASTODES PAUCISPINIS (Ayres).

(BOCACCIO; MEROU; JACK.)

Head 2⅔; depth 3¾; eye 4 to 6 in head. D. XIII, 13; A. III, 9; P. 5. Lateral line with 65 to 80 tubes, about 100 scales in longitudinal series. Body elongate, compressed, profile straight from protruding tip of lower jaw to front of dorsal. Head large, long, narrow, and pointed. Mouth much larger than in any other species, oblique, the broad maxillary reaching to beyond eye, its length 1¾ in head; lower jaw very strong, with a projecting knob at tip, which protrudes farther than in any other species. Premaxillary on level of lower edge of pupil. Interocular space broad, with 2 low ridges; top of head scaled to tip of snout; maxillary and preorbital scaly; preorbital with narrow neck and 3 small spines; suborbital stay moderate; preopercular spines sharp and diverging, third largest, the lower often divided; opercular spines moderate. Gill rakers slender, compressed, not very long. Eye large, slightly more than interorbital width. Scales very small and rough, irregular; accessory scales few. Dorsal spines low, rather slender, fin deeply emarginate, longest spine ⅖ length of head, scarcely higher than soft rays; caudal emarginate; anal low, its spines small, short, graduated, the second shorter than eye; pectorals narrow, rather long, not nearly reaching vent, the base ¾ diameter of eye; ventrals shorter, not reaching tips of pectorals. Pale dull orange red, dark brown above, the sides somewhat vaguely spotted; young olivaceous; fins nearly plain, lower reddish; upper dusky; tip of lower jaw dark. Bones of skull thick; cranial ridges (except parietals) and spines all obsolete; small spines usually present in the young, occasionally in adults; parietal ridges low but distinct; parietal bones usually widely separated; interorbital space convex, broad, very nearly 3 in base of skull in adult; mesethmoid processes weak, flat, depressed; ventral process of basisphenoid rudimentary, base of skull (parasphenoid) markedly curved. Length 30 inches. San Diego to San Francisco; abundant in rather deep water. (*pauci*, few; *spina*, spine.)

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* Base of skull measured from tip of vomer to posterior end of basioccipital.

Sebastes paucispinis, AYRES, Proc. Cal. Ac. Sci., I, 1854, 6, San Francisco; GIRARD, U. S. Pac. R. R. Survey, X, Fishes, 83, 1858; GILL, Proc. Ac. Nat. Sci. Phila. 1861, 165; AYRES, Proc. Cal. Ac. Sci. 1862, 215; GÜNTHER, Cat., II, 98.

Sebastodes paucispinis, JORDAN & GILBERT, Synopsis, 656, 1883.

Subgenus SEBASTOSOMUS, Gill.

2181. SEBASTODES FLAVIDUS (Ayres).

(YELLOW-TAIL ROCKFISH.)

Head 3; depth 3; pectoral 4. D. XIII, 15; A. III, 9; scales about 60. Body oblong, compressed, back not much elevated. Head rather long, pointed; mouth large, oblique, the maxillary extending to nearly opposite posterior margin of eye, 2 in head; premaxillaries in front on level of lower margin of pupil. Lower jaw strongly projecting, its symphyseal knob very prominent, but less so than in *Sebastodes paucispinis*. Preorbital narrow, without spines. Top of head evenly scaled, nasal spines only present and very small. Only the parietal ridges visible under scales. Preopercular spines rather strong, all of them directed strongly backward; opercular spines moderate; suprascapular spines small, the upper obsolete. Scales medium; accessory scales variable. Dorsal spines low, slender, longest 3 in head; soft rays rather high, fin very deeply emarginate, membrane joining thirteenth spine at about ¼ its height; caudal fin notched; anal spines low, regularly graduated, third spine less than ½ the height of soft rays, second as long as eye; pectoral fins shortish, rather broad, reaching tip of ventrals, but not quite to vent. Olive green, rather pale, plain or finely spotted with yellowish; fins olive, caudal strongly tinged with yellow; young mottled; peritoneum white. Bones of skull rather thick, cranial spines all absent, parietal ridges low, weak, curved, the outer ridges absent; parietal bones meeting; interorbital space wide, 3 in base of skull, nearly evenly convex; mesethmoid processes quite strong, somewhat compressed, not elevated; ventral process of basisphenoid rudimentary, base of skull strongly curved. Length 24 inches. San Diego to San Francisco, abundant; an important food-fish. (*flavidus; flavus*, yellow.)

Sebastodes flavidus, AYRES, Proc. Cal. Ac. Sci. 1862, 209, fig. 64, San Francisco (Coll. W. O. Ayres); JORDAN & GILBERT, Synopsis, 657, 1883.

2182. SEBASTODES SERRANOIDES, Eigenmann & Eigenmann.

Head 3; depth 3⅓ to 3½; eye 4½ in head. D. XIII, 15 or 16; A. III, 9; lateral line 60 (pores). Elongate, slender, the dorsal profile but little more arched than ventral; head compressed, anterior profile almost straight; snout long, pointed; lower jaw projecting, its tip entering profile. Eye large, 1⅓ in snout, 1¼ in strongly convex interorbital. Cranial ridges nearly obsolete, none of them ending in spines; nasal spines minute, not evident externally. Parietal bones meeting above. Preorbital without spines; preopercular spines long, slender, the lower ones as well developed as the middle ones in largest specimens; opercular spines as in *Sebastodes flavidus*. Gill rakers long and slender, as in *Sebastodes flavidus*. Scales large, those of head greatly reduced; snout, mandibles, and even the lips closely scaled in the old; palatine patches of teeth peculiar, a constriction near their middle, the anterior angle turned inward. Dorsal fin low, the highest spine about 3 in head, notch between the 2 fins deep; caudal notched; anal spines slender, graduated; pectorals not reaching tips of ventrals, not nearly to vent. Gray of varying shades, the back always darker; a series of large white blotches along sides of back much more marked in some examples than in others; fins all more or less strongly tinged with yellow and edged with dusky. Length about 20 inches. Cortez Banks off San Diego. (Eigenmann.) (*Serranus*; εἶδος, resemblance.)

Sebasticthys flavidus, EIGENMANN & EIGENMANN (not of AYRES), West American Scientist 1889, 128.

Sebastodes serranoides, EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci. 1890, 36, Cortez Banks. (Coll. C. H. Eigenmann.)

2183. SEBASTODES MELANOPS (Girard).

Head 3; depth 2⅔. D. XIII, 16; A. III, 8; scales 60 to 70, 53 pores; pectoral 4¼. Head long, in form intermediate between *S. mystinus* and *S. flavidus*. Maxillary not quite reaching posterior margin of orbit, its length a little less than ½ head; lower jaw protruding, its tip on a line with descending profile. Eye large. Cranial ridges all scaled over and without spines in the adult; space forward of eye not projecting; preopercular spines short, but sharp. Gill rakers longer than in *S. mystinus*, very slender. Dorsal rather low, deeply emarginate, highest spines 2⅓ in head, a little lower than soft rays; caudal slightly emarginate; anal spines small, the second shorter but stouter than third, longer than eye; pectorals short and rather broad, not reaching as far as tips of ventrals, which scarcely reach vent. Scales moderate; accessory scales numerous; mandible, maxillary, preorbital, and snout closely scaled. Olive brown, dark above, sides paler; upper part of sides thickly marked with small slaty-black blotches; head blackish above; a dark streak on maxillary and one from eye across cheek; fins dusky, dorsal paler at base, with many dark olive-brown spots; a black ocular spot; lower rays of pectorals often tinged with orange; peritoneum white. Bones of skull thick, cranial ridges (except parietals) and spines obsolete; parietal ridges moderate, sometimes ending in a small spine; small supra- or postocular spine sometimes present; parietal bones touching or overlapping in middle third of their length; interorbital space broad, convex, nearly 3 in base of skull in adult, mesethmoid processes not elevated; ventral process of basisphenoid rudimentary; base of skull (parasphenoid) markedly curved. Length 20 inches. Monterey to Kadiak, most abundant northward; very abundant at Sitka, where it is called "Black Bass." At San Francisco much less common than *S. mystinus*; about Humboldt Bay much more common, being the most abundant food-fish. (*μέλας*, black; *ὤψ*, face.)

Sebastes melanops,* GIRARD, Proc. Ac. Nat. Sci. Phila., VIII, 1854, 135, and in U. S. Pac. R. R. Surv., X, Fishes, 81, 1858, Astoria and Cape Flattery; AYRES, Proc. Cal. Ac. Sci. 1862, 213, fig. 66; GÜNTHER, Cat., II, 98.

Sebastosomus simulans,* GILL, Proc. Ac. Nat. Sci. Phila. 1864, 147, Cape Flattery.

Sebastodes melanops, CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 592, pl. 58, fig. 4.

Subgenus PRIMOSPINA, Eigenmann & Beeson.

2184. SEBASTODES CILIATUS (Tilesius).

Head 3¼; depth 3 to 3¼. D. XIII, 16; A. III, 8; P. 18 or 19; transverse (oblique) rows of scales 46 or 47 (+ 3 or 4 on caudal); pores in lateral line 46 or 47. Body compressed, deep, its width over the base of the pectorals about 2 in the depth; dorsal outline descending rapidly backward in a slight curve from origin of first dorsal to end of second dorsal; depth of peduncle more than 3 in depth of body; head compressed, profile steep and nearly straight; eye moderate, orbit circular, its diameter a little longer than snout, 3⅔ in head, its posterior rim at about the middle of length of head. Interorbital space strongly convex, its depth a little less than orbit, $3\frac{6}{7}$ to 4 in head. Nasal spines small; cranial ridges and spines all obsolete, except the parietal; parietal ridge very slightly developed, with a minute point or none, covered with scales. Mouth moderate, quite oblique; tip of upper jaw on a level with center of eye; maxillary 2⅓ in head, its posterior end reaching about to vertical from posterior edge of pupil; lower jaw a little projecting, with a slight symphyseal knob. Very narrow bands of teeth on jaws, vomer, and palatines. Preorbital moderate, its lower edge scarcely at all indented or entirely continuous, spineless; suborbital stay scarcely visible; preocular spines small, the 3 upper directed backward and slightly diverging, nearly equidistant and of equal size, the 2 lower minute or obsolescent; opercular spines small, without visible ridges. Gill rakers slender, 2 in orbit, 23 or 24 on anterior limb of first arch. Dorsal fin rather low, the spines delicate, the fifth longest, 2¼ to 2⅙ in head, the second about equal to the eleventh, the twelfth about 1⅓ in the thirteenth, the membrane rather deeply incised anteriorly and reaching about halfway up the thirteenth spine: soft rays about equaling the spines; caudal fin slightly lunate, its length about 1½ in head; second and third anal spines about equal in length, the former a little the stronger, 1⅓ in the soft rays; pectorals reaching very nearly to vent, a little less than head, 3½ in body, their base nearly 3 in their length, the median rays longest; ventrals not reaching vent, about 1⅓ in pectorals. Scales on body, opercles, and interorbital space strongly ctenoid, those on mandibles, maxillaries, and most of those on cheeks cycloid; preorbital and snout with minute scales: accessory scales few. Color in alcohol, dark reddish brown, mottled with lighter; top of head nearly black; a dark stripe on edge of lower jaw, another on maxillary: a dark-brown band from preorbital downward and backward to posterior edge of preopercle: a broader band from posterior rim of orbit backward and downward across preopercle and opercle; fins all dusky, the dorsals somewhat mottled; peritoneum black. Coast of Alaska, rare; not recently noticed except about Kadiak. The above description is taken from 3 specimens, 5¼ to 5¾ inches long, from Kadiak, in the possession of the Alaska Commercial Company. No others have been obtained since the time of Pallas and Tilesius. (*ciliatus; cilium*, eyelid. with the lashes.)

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* Referring to Dr. Girard's description of this species, Dr. Gill remarks:

"It is also proper to remark that 2 species are apparently confounded by Girard under the name *Sebastes melanops*, 1 with 'a small spine upon the suprascapular bone, 2 others upon the edge of the opercle,' and another from Cape Flattery, with the lower opercular spine as well as the supraorbital ridges obsolete, and the forehead between the eyes perfectly arched. The latter may be named *Sebastosomus simulans* (Gill)."

Epinephelus ciliatus,* TILESIUS, Mèm. Ac. Sci. St. Petersb., IV. 1810, 474, "Camtschaticus et Americanus;" no specific locality given, probably from about Kadiak.

Perca variabilis, PALLAS. Zoogr. Rosso-Asiat., III. 241, 1811. Aleutian Islands. (Type in museum of Berlin; red specimens of *Sebastodes aleutianus* included as the summer coloration of "*variabilis*.")

Sebastes variabilis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 347; GÜNTHER, Cat., II, 99.

Sebastodes ciliatus, JORDAN & GILBERT, Synopsis, 658, 1883; CRAMER. Proc. Cal. Ac. Sci. 1895, 592.

2185. SEBASTODES MYSTINUS, Jordan & Gilbert.

(PÊCHE PRÊTRE; PRIEST FISH; BLACK ROCKFISH.)

Head 3⅓; depth 2¾; pectorals 3⅓ in head. D. XIII, 15; A. III, 9; scales 66, 50 to 55 pores. Body oval-oblong, compressed, both outlines evenly curved. Head rather blunt, compressed; profile oblique, almost straight, becoming convex with age. Mouth smaller than in any of the preceding species, oblique, lower jaw protruding; premaxillaries on level of lower rim of orbit; maxillaries dilated behind. reaching posterior margin of pupil, thickly scaled behind, their length 2⅕ in head. The region between and in front of eyes bulging considerably; preopercle with rather strong spines, the 2 at the angle longest; opercular spines rather strong. Spinous dorsal very low, the longest spines 2½ in head, lower than soft rays, fin rather deeply emarginate: second anal spine stronger than third, and a little shorter, 3½ in head; pectoral fins long, about as long as head, their middle rays longest, reaching beyond ventrals to about tenth dorsal spine; caudal emarginate. Bones of skull thick; spines all absent, except preocular, which is sometimes present, ridges obsolete except the parietal, which are low and weak, somewhat curved, the parietals meeting or slightly separated; interorbital space broad, evenly convex, 2¾ in base of skull; mesethmoid processes small, somewhat compressed, not elevated; ventral process of basisphenoid rudimentary; base of skull very strongly curved. Slaty black, becoming paler below the lateral line; sides more or less mottled; tips of lower jaw black; top of head with 3 indistinct cross bars, extending on the cheeks; a dark bar on anterior edge of opercle; fins all dusky; peritoneum black. Length 14 inches. Puget Sound to San Diego; the most abundant species of the family about San Francisco; found in rather shallow water. (*μύστης*, a priest, from the dark color.)

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* D. XIII, 14; A. III, 8; scales 43; no description of color.

Sebastichtys mystinus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 455, and 1881, 56, 70 San Francisco. (Type, No. 26965. Coll. Jordan & Gilbert.)
Sebastodes mystinus, JORDAN & GILBERT, Synopsis, 659, 1883.

Subgenus **ACUTOMENTUM**, Eigenmann & Beeson.

2186. SEBASTODES ENTOMELAS (Jordan & Gilbert).

Head 3¼; depth 3⅓; pectoral 3⅔ in head. D. XIII, 15; A. III, 8; scales 65. Body oblong-elongate, back little arched. Caudal peduncle slender. Profile less steep than in *S. ovalis*, snout blunter. Mouth small, short maxillary extending to below middle of eye, its length 2⅓ in head; lower jaw protruding, its tip entering the profile; preorbital very narrow, without spine. Eye large, less than interorbital space, 4 in head. Cranial ridges mostly covered by the scales; preopercular spines small, directed backward; opercular spines small; jaws, preorbital, and snout with small scales. Gill rakers numerous, long and slender, their length about ⅔ diameter of eye. Dorsal spines very low and slender, longest about 3 in head, fin moderately emarginate; soft dorsal long and low, not much higher than spines; caudal lunate; anal low, its second spine stronger than third, but not so high, 3¼ in head; pectorals moderate, reaching beyond ventrals, not to vent. Bones of skull rather thick, ridges all absent except the parietals, which are low and weak; preocular, supraocular, postocular, tympanic, and parietal spines usually present, weak; parietal bones scarcely meeting; interorbital space broad, 3 in base of skull, convex; ventral process of basisphenoid weakly developed in young (rudimentary in adults); mesethmoid processes somewhat compressed, not elevated; base of skull very strongly curved. Dull olive green; sides with obscure, round, rusty spots; belly, lips, and lower parts tinged with creamy; obscure light and dark shades across cheeks; 2 or 3 obscure dark vertical bars; fins all dusky, somewhat reddish tinged; lower half of pectoral reddish; peritoneum jet-black. Length 12 inches. Coast of California, Point Concepcion to Monterey Bay, in deep water; rare. (*ἐντός*, within; *μέλας*, black.)

Sebastichthys entomelas, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 142, Monterey, California. (Type, No. 27044. Coll. Jordan & Gilbert.)

Sebastodes entomelas, JORDAN & GILBERT, Synopsis, 659, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 293, pl. 58, fig. 5.

2187. SEBASTODES RUFUS, Eigenmann & Eigenmann.

Head 3; depth 3½. D. XIII, 14½; A. III, 8½; 56 pores in lateral line. Body compressed, elongate; profile straight, less steep than in *Sebastodes ovalis*, snout broader. Eye moderate, orbit slightly longer than snout, 3½ to 4 in head. Maxillary reaching to middle or little beyond middle of eye; mandible with a prominent symphyseal knob. Interorbital slightly convex, as wide as orbit in smaller specimen, wider in the larger; preocular, supraocular, postocular, tympanic, and parietal spines present; the parietal ridges higher, narrower, more diverging and more conspicuous than in *S. ovalis;* preocular as fully developed as in *S. ovalis;* preorbital very narrow, about 4 in orbit, with 2 small backward-directed spines; preopercular spines long and slender, all of them longer and stronger than *S. ovalis*, the lower 2 very long, the second reaching beyond base of third, not nearly reaching base of third in *S. ovalis.* Head entirely covered with moderate-sized scales, those of body larger. Outlines of spinous dorsal little arched, highest spine slightly more than 3 in head, the highest ray about equal to highest spine; caudal emarginate; anal spines graduated, second equal to highest dorsal spine. Rufous, variously marked with brown; lateral line rufous; upper angle of opercle, a line from eye downward and backward to upper half of pectoral, another parallel to it from upper angle of maxillary backward, and tips of jaws dark brown; these markings conspicuous; head otherwise rufous; axil black; margin of spinous dorsal and greater part of membranes of soft dorsal black; base of dorsal rufous, spotted with darker; caudal dusky; membranes of the remaining fins chiefly black, the rays rufous; peritoneum jet-black. Length about 22 inches. San Diego; Cortez Banks; not seen by us. (Eigenmann & Eigenmann.) (*rufus*, red.)

Sebastodes rufus, EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci. 1890, 13, Point Loma; Cortez Banks. (Coll. C. H. Eigenmann.)

2188. SEBASTODES MACDONALDI (Eigenmann & Beeson).

Head 3 in total length; depth 3¾. D. XIII, 13½; A. III, 7½. Elongate; head pointed; eye small, orbit 1⅖ in snout, 4¾ in head, 1⅙ in interorbital; lower jaw projecting; maxillary reaching to below posterior margin of eye, 2 in head. Interorbital slightly convex, without ridges; cranial ridges low, obscure, all terminating in short spines; preocular, supraocular, postocular, tympanic and parietal spines present; preorbital ⅗ diameter of orbit, with 3 retrorse spines below, the posterior smallest; a retrorse spine just below orbit; opercular spines simple and strong. Mandible, maxillaries, suborbitals, and entire snout scaled; scales of head small, ctenoid, those of body larger. Spinous dorsal regularly arched, fourth and fifth spines highest, 3 in head, highest ray 3⅖ in head; anal spines graduated, the second considerably stronger but shorter than third, the latter 5⅓ in head, longest ray 3 in head; pectorals reaching somewhat beyond ventrals. Top of head and back chiefly black, lateral line vermilion, a blackish band just below lateral line, much wider forward, extending on sides below the fifth dorsal spine; a large opercular spot, a broad band downward and backward from eye, a narrow one across cheek below eye, lips and tip of lower jaw chiefly black, rest of head and sides chiefly vermilion; anal and ventrals vermilion, pectorals and caudal blackish, dorsal nearly black, axils dusky. Peritoneum, black. Length 24 inches. San Diego; not seen by us. (Eigenmann & Eigenmann.) (Named for Hon. Marshall McDonald.)

Sebastodes proriger, EIGENMANN & EIGENMANN (not of JORDAN & GILBERT), Proc. Cal. Ac. Sci. 1890, 15, San Diego.

Acutomentum macdonaldi, EIGENMANN & BEESON, Amer. Naturalist 1893, 669, San Diego. (Coll. Eigenmann.)

2189. SEBASTODES BREVISPINIS (Bean).

Head 2⅔; depth 3½. D. XIII, 14; A. III, 7; scales 86 or 87, 51 tubes. Body elongate, compressed, its greatest width ⅓ length of head; caudal peduncle short, its least depth ⅚ of its length from end of soft dorsal to base of middle caudal rays; head similar in shape to that of *S. proriger*. Cranial ridges almost obsolete, except on the occiput, where the spines are long and depressed, nearly as long as the eye; preocular and supraocular spines present; no tympanic spines. Mouth large, the broadly expanded maxillary reaching beyond the middle of the eye; length of the upper jaw (intermaxilla and maxilla) almost ½ length of head; lower jaw much projecting, its length equaling that of eye and postorbital part of head; upper half of the maxilla covered with very fine scales; the mandible also has fine scales along its middle and posterior portions; mandible with a well-developed knob at the symphysis; eye ¾ as long as snout, rather more than ⅕ length of head, and about equal to width of the nearly flat interorbital space; width of preorbital less than ½ length of eye; preopercular spines short and sharp, second longest, about ⅓ as long as the eye, the first, fourth, and fifth very small; the points of the fourth and fifth directed obliquely downward and backward. Gill rakers moderately long and slender, 11 + 23, the longest at the angle ½ as long as the snout or ⅔ as long as the eye. Spinous dorsal low, the first spine ⅔ as long as the second, and rather more than ⅔ as long as eye; the fourth to the sixth spines longest, rather more than ⅓ length of head. Membrane of soft dorsal and to some extent that of the spinous dorsal scaly; longest soft ray of dorsal rather shorter than the longest spine; the last soft ray as long as the first spine; first anal spine very short, ⅖ as long as the second, or ½ as long as the eye; the second spine shorter and stouter than the third, equal to the snout in length; the third spine nearly 1½ times as long as the eye; longest soft ray exceeding length of longest dorsal spine and nearly equal to the postorbital part of the head; pectorals shaped very much as in *S. proriger*, the lower 4 or 5 rays slightly exserted at the ends, the middle rays longest, slightly longer than the head without the postorbital part; ventrals not extending as far back as the pectorals, their distance from the vent equal to ½ their own length, which is ⅖ length of head. Peritoneum silvery white. In spirits the back is pale rusty brown; the sides below the lateral line paler; belly whitish: traces of dark color on the membrane of the spinous dorsal; soft dorsal, pectorals, ventrals, and anal pale; some traces of brownish on the caudal membranes. In *S. proriger* the second anal spine is distinctly longer than the third; the peritoneum is black; a tympanic spine is present; the gill rakers 40 in number and many of them club-shaped at the end, the longest rather more than ½ the length of the eye; the fourth and fifth preopercular spines are directed horizontally backward, and the scales are in 75 rows. These comparisons are drawn from the type of *S. proriger*. Length 14½ inches. Coast of southeastern Alaska (Bean); not seen by us; known only from the type taken in Hassler Harbor. (*brevis*, short; *spinna*, spine.)

Sebastichthys proriger var. *brevispinis*, BEAN, Proc. U. S. Nat. Mus. 1883, 359. Hassler Harbor, southeastern Alaska. (Type. No. 32004. Coll. Capt. Henry E. Nichols.)
Sebastodes proriger, JORDAN & GILBERT, Synopsis,* 950. 1883; Alaskan specimens.
Sebastichthys brevispinis, JORDAN. Cat. Fishes N. Amer., 107, 1885; BEAN, Proc. U. S. Nat. Mus. 1894. 627.

2190. SEBASTODES OVALIS (Ayres).

(VIUVA; WIDOW-FISH.)

Head 3; depth 2¾. D. XIII, 14; A. III, 8; pectoral 3⅕; height of dorsal 8; lateral line about 70. Body deep, almost oval, back considerably elevated, profile steep, lower jaw considerably protruding: mouth not large. maxillary reaching to posterior edge of pupil, its length about 2½ in head; preopercular spines long and slender. all projecting backward; opercular spines strong; preorbital narrow, with 2 bluntish spines. Gill rakers very long and slender. longest ⅔ diameter of eye. Eye large. slightly longer than snout. Dorsal fin very low, notch between spinous and soft parts very shallow, height of 2 parts about equal (2½ in head), the membrane joining last spine at about ¾ its height; second anal spine longer and stronger than third, almost as high as soft rays. 2⅓ in head; pectorals long. reaching beyond tips of ventrals; caudal emarginate; maxillary and mandible scaly; bones of skull rather thick, preocular spines strong. supraocular, postocular. tympanic, and parietal spines present, small, and weak. ridges nearly obsolete. except parietal, which is low and weak; parietal bones meeting; interorbital space 3⅓ in base of skull, slightly convex; ventral process of basisphenoid rather weak in young (rudimentary in adults); mesethmoid processes compressed, rather weak. not elevated; base of skull very much curved. Olivaceous, strongly tinged with creamy red, especially below; membrane of both dorsals covered with many small, round, black spots; similar spots usually on body; upper fins greenish, lower yellowish, mostly dark-edged; caudal fin dark; young more green, with 2 or 3 large black blotches on upper part of sides, and without dark spots on fins; peritoneum black. Length 14 inches. Coast of California, San Diego to San Francisco, rare; in rather deep water. (*ovalis*, oval.)

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* The statement in Jordan & Gilbert's Synopsis, p. 950, that *Sebastodes proriger* has been confounded by Tilesius and Pallas with *Sebastodes ciliatus* is erroneous. The specimens called by them *ciliatus* and *variabilis* include *ciliatus* and *aleutianus*. The true *proriger* is not yet known from Alaska.

Sebastodes ovalis, AYRES, Proc. Cal. Ac. Sci. 1862, 209 to 212, fig. 65, San Francisco; JORDAN & GILBERT, Synopsis, 660, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 594, pl. 58, fig. 6.

Sebastichthys ovalis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 143; EIGENMANN & EIGENMANN, West American Scientist 1889, 128.

2191. SEBASTODES EIGENMANNI, Cramer.

Head $2\frac{7}{10}$; depth $2\frac{5}{6}$. D. VIII, 14; A. III, 8; P. $18\frac{9}{9}$; pores in lateral line 41 (+ 2 on base of caudal); transverse rows of scales 41. Body compressed, its width (behind opercles) about $2\frac{1}{2}$ in its depth; greatest width of head $2\frac{2}{5}$ in its length; profile steep; interorbital space flat, $5\frac{1}{7}$ in head; supraocular and parietal ridges quite well developed, the former flat, the latter diverging backward; preocular, supraocular, postocular, tympanic and parietal spines present, not very large, but sharp; a curved shallow groove at each side of interorbital space inside of the supraocular ridges. Orbit large, nearly circular, $3\frac{1}{4}$ in head, its upper rim on a level with the profile. Snout short, about equal to interorbital width; preorbital moderate, with 2 small, sharp spines directed downward and backward; maxillary $2\frac{2}{5}$ in head, reaching a little beyond vertical from posterior edge of pupil; mandible projecting somewhat, with a moderate symphyseal knob. The uppermost preopercular spine small, directed a little upward, the second longest, horizontal, the fourth and fifth small, but evident; upper opercular spine slender and sharp, the lower shorter. Gill rakers long and slender, about $2\frac{1}{3}$ in the orbit, 23 on horizontal limb of first arch. Scales rough, ctenoid, those on opercles, cheeks, and interorbital space and snout somewhat rough; those on maxillary, mandible, and breast mostly cycloid; very few accessory scales. Spines of dorsal moderate, the fourth longest, $2\frac{1}{4}$ in head, the fifth, sixth, and seventh nearly equal, the twelfth $2\frac{1}{4}$ in the fourth, the membrane deeply incised; longest dorsal ray about equal to longest spine; anal spines graduated, the second nearly as long as and but little stronger than third, $2\frac{3}{5}$ in head, $1\frac{1}{3}$ in the soft rays; caudal truncate, or a little rounded; base of pectorals 4 in head, the 9 lower rays simple, the middle rays longest, reaching a little beyond vent, $3\frac{1}{5}$ in length of body; ventrals reaching vent. Color in alcohol, reddish brown; pale below; dorsal and pectorals dusky; membranes of spinous dorsal black-edged, and tips of ventrals blackish; peritoneum white, with a few black specks. This species is nearest to *Sebastodes ovalis*, but the mouth is larger and the color different. One specimen, 7 inches long, taken at Monterey, California. (Named for Dr. Carl H. Eigenmann, of the University of Indiana, in recognition of his work on the genus *Sebastodes*.)

Sebastodes eigenmanni, CRAMER, in JORDAN, Proc. Cal. Ac. Sci. 1896, 239, pl. 42, Monterey California. (Coll. Dr. W. W. Thoburn. Type, No. 4046, L. S. Jr. Univ. Mus.)

2192. SEBASTODES HOPKINSI, Cramer.

Head 3; depth $3\frac{2}{5}$. D. XIII, 14; A. III, 7. Transverse rows of scales (halfway between lateral line and back) about 52; pores about 51. Body compressed, not very deep; profile steep; depth of caudal peduncle a little less than orbit. Head compressed; eye large, orbit 3½ in head; interorbital space evenly convex, 4½ in head; cranial ridges nearly obsolete; parietal ridges very low but broad, brown; nasal spines small, far apart; preocular rather strong, triangular; supraocular and postocular usually present, very minute; tympanic and parietal spines sometimes present. Mouth moderate, oblique; maxillary very little more than 3 in head, nearly reaching vertical from center of pupil, its posterior end very wide, 2 in orbit; lower jaw much projecting, with a prominent, forwardly directed, symphyseal knob, which enters the profile; narrow bands of teeth on jaws, vomer, and palatines; preorbital rather narrow, its lower margin lobate, with sometimes a small spine; preopercular spines flat, sharp, nearly equidistant, all directed backward, the second longest, fourth and fifth minute; opercular spines flat, sharp, somewhat diverging, the upper considerably larger; spines on shoulder weak; gill rakers 29 on anterior limb, long, slender, very little more than 2 in orbit. Dorsal spines slender, low, the fourth longest, 2⅗ in head, the twelfth ⅔ as long as longest; soft rays equal longest spines; only a slight notch between the 2 dorsals; caudal lunate, 1⅗ in head; second anal spine stronger and considerably longer than third, longer than soft rays, longer than longest dorsal spine, very little more than 2 in head; pectorals reaching beyond ventrals, but not to vent, a little less than head, 3½ in length of body, their base narrow, equal to orbit, the lower rays not thickened. Scales rather small, everywhere strongly ctenoid; accessory scales not very numerous; preorbital, snout, maxillaries, mandible, and branchiostegal rays scaled; all the fin rays more or less scaly. Bones of skull thin, cranial ridges nearly obsolete, parietal bones meeting; interorbital space somewhat convex, 3⅓ in base of skull; a slight depression on each side of a sharp narrow median ridge, and another just within each supraocular ridge; ventral process of basisphenoid rudimentary; mesethmoid processes compressed, not elevated; base of skull very strongly curved. Color much as in *Sebastodes ovalis;* dark olivaceous, tinged with reddish, especially below; a large irregular dark blotch under soft dorsal, crossing lateral line; a smaller one on lateral line below posterior part of spinous dorsal; top of head and anterior part of back to about ninth dorsal spine nearly uniformly dark to below lateral line; 2 indefinite dark bands from behind orbit across preopercle and opercle; lips black; dorsal fin olivaceous; spinous dorsal dark-edged; soft dorsal darker at base; caudal and pectorals olivaceous; axils dark; ventrals yellowish; anal pale; no small round black spots anywhere; peritoneum black. Length of type specimen 7¾ inches. Monterey Bay, California; not rare; formerly confounded with the young of *S. ovalis;* more common than the latter. (Named for Mr. Timothy Hopkins, founder of the Hopkins Seaside Laboratory.)

Sebastodes hopkinsi, CRAMER, Proc. Cal. Ac. Sci. 1895, 594, Monterey Bay, California (Type, No. 2286, L. S. Jr. Univ. Mus. Coll. Jordan & Gilbert); JORDAN, Proc. Cal. Ac. Sci. 1896, 237, pl. 41.

2193. SEBASTODES ALUTUS (Gilbert).

Head 2⅔ to 2¾; depth 3 to 3⅓; eye 3⅓ in head. D. XIII, 15; A. III, 8; P. 17; scales 60. Mouth large, maxillary reaching back of pupil, 2¼ to 2⅙ in head; premaxillaries notched, the symphyseal patch of teeth, however, shutting outside them. Teeth on jaws, vomer, and palatines in very narrow bands except at symphysis and on vomer; a conspicuous depression on each side of symphysis to receive the anterior premaxillary patch. Eye very large, the diameter exceeding snout. Interorbital space very wide, flat or slightly convex, conspicuously grooved, its width 1⅔ eye. Soft fins wholly enveloped in fine scales. Cranial ridges all low, the spines slender; coronal and nuchal spines alone absent. Mandible projecting much beyond the upper profile of head, the symphyseal knob very strongly developed in the adult, not noticeably so in young. Gill rakers long and numerous, ½ as long as eye. Second and third anal spines about equal. Cranial ridges all very low, inconspicuous and with a small spine or none; nasal and preocular evident; supraocular, postocular, and tympanic present but hidden by scales, more conspicuous in the very young; parietal ridges evident, ending in low spines; preorbital narrow, its least width ⅐ eye, its anterior edge with 2 long mucous slits, and in some cases a single backwardly directed spine; opercular and humeral spines well developed; preopercular spines flat, not very large, the upper 2 approximated, the lower 2 broadly triangular, tipped with short spines, directed downward and backward; dorsal spines curved, the longest 2½ to 2¾ in head, the twelfth about ⅔ the longest; soft dorsal about as high as the longest spines; anal spines strong, the second slightly shorter than the third, which equals or slightly exceeds diameter of eye. In the young the second anal spine constantly equals or exceeds the third, but grows relatively shorter with age; soft anal rays higher than soft dorsal, 2⅓ in head; caudal well notched, ventrals long, reaching vent; pectorals longer, reaching nearly to front of anal. Gill rakers long, clavate, ½ diameter of orbit, 25 on anterior limb of arch. Scales rough, ctenoid, with many accessory minute ones, which are especially abundant on head and nape; head wholly scaled, including the interopercle, maxillary and mandible, and the outer branchiostegal rays; anterior surface of pectorals and outer caudal rays closely invested with minute ctenoid scales which extend well toward tips, also of soft dorsal and anal fins. Color bright carmine red, lighter on belly; dorsal dusky, edged with black; an elongate olive brown blotch along base of soft dorsal; a shorter one under the last spines, and a faint one under the middle of spinous dorsal, the latter extending farther down on sides; a dark blotch on back of caudal peduncle; belly silvery, washed with red; a dark blotch on opercle, 1 on axil, cross bar on occiput, 1 on snout and 2 dusky bars on cheek; lower lip and tip of mandible blackish; mouth and gill cavity dusky; fins all red, the spinous dorsal broadly margined with blackish; peritoneum jet-black in the young, varying from black to gray in adults; length 12 to 18 inches. Pacific coast from Bering Sea to Santa Barbara; common northward in deep water. This species was described from a single immature example, dredged by the *Albatross* south of Santa Cruz Island, southern California. No additional material was obtained during the extensive dredging operations of the *Albatross* on the California coast. The species is, however, very abundant in the north Pacific, both north and south of the Aleutian Islands. It was taken at various dredging stations, north of Unalaska Island, in the vicinity of Unimak Pass, in Bristol Bay, and south of the Alaskan Peninsula, in depths of 38 to 128 fathoms. A single individual was also taken with hook and line in Unalaska Harbor. At one of the above stations 48 specimens were taken with the beam trawl. This additional material shows that *S. alutus* is one of the bright-red rockfish, most closely allied, perhaps, to *S. miniatus*. From the latter it differs conspicuously in the greatly produced mandibular symphysis, with the very pronounced symphyseal knob, as well as in other respects. It is allied also to *S. proriger*, but differs among other points in having both postocular and tympanic spines developed. Its relations to *S. brevispinis*, Bean, are also close. (Gilbert.) (ἀλουτός, unwashen, from the speckled coloration.)

Sebastichthys alutus, GILBERT, Proc. U. S. Nat. Mus. 1890, 76, Santa Barbara Islands. (Type, No. 48244. Coll. *Albatross*.)

2194. SEBASTODES PRORIGER (Jordan & Gilbert).

Head 3; depth 3⅓. D. XIII, 13; A. III, 7; P. 3¼ in length; scales 75. Body elongate, somewhat compressed, a little less slender than in *Sebastodes elongatus*, which this species much resembles in color and form. Head rather small; mouth small, much as in *S. ovalis*, the short, broad maxillary extending to beyond the middle of the eye, the premaxillary on the level of lower margin of pupil; maxillary 2¼ in head; lower jaw strongly projecting, with a conspicuous symphyseal knob. Eye very large, longer than snout; preorbital narrow. Cranial ridges very low and weak; preocular, supraocular, tympanic, and occipital present; most of the ridges partly covered by scales; tympanic spine minute; occipital ridge not conspicuous, the spine depressed; preopercular spines sharp, the second longest, the points of all directed backward; opercular spines moderate. Interorbital space broad, nearly as broad as the eye, somewhat regularly convex, the middle being elevated. Gill rakers very long, slender and numerous, the longest longer than supraocular ridge, and about ½ the diameter of eye. Scales rather small. Dorsal fin very low, as in *S. ovalis*, not deeply emarginate, the highest spine little more than ⅓ length of head; soft dorsal low, ½ as high as long, the highest ray about equal to the longest spine; caudal fin moderately forked; anal fin low, its length nearly equal to the height of its longest ray; second spine much longer and stronger than third, scarcely shorter than longest ray, 2⅓ in head; pectorals rather long and narrow, the tips reaching beyond tips of ventrals to vent. Bright light red, mottled above with dusky olive green, the ground color forming distinct blotches under third dorsal spine and under first and last rays of soft dorsal; lateral line running in the middle of a very distinct continuous red stripe, precisely as in *S. elongatus;* head above with purplish cross shades; opercle with a dusky blotch; 2 olive shades radiating from the eye; lips and tip of lower jaw blackish; iris red; caudal fin bright red, speckled with dark olive; spinous dorsal bright red, the posterior part of each membrane blackish; soft dorsal olive and red; lower fins bright light red, with shades of olive yellow; peritoneum black. Length 10 inches. Coast of California, from San Diego to San Francisco, in deep water; not rare. (*prora*, prow; *gero*, I bear.)

Sebastichthys proriger, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 327, Monterey. (Type, No. 27105. Coll. Jordan & Gilbert.)
Sebastodes proriger, JORDAN & GILBERT, Synopsis, 661, 1883.

Subgenus ROSICOLA, Jordan & Evermann.

2195. SEBASTODES PINNIGER (Gill).

(FLIOMA; ORANGE ROCKFISH.)

Head $2\frac{2}{3}$; depth $2\frac{3}{5}$; pectoral $3\frac{1}{2}$. D. XIII, 14; A. III, 7; scales 48. Body rather robust, elevated, and compressed; mouth large, oblique, maxillary reaching to below posterior margin of large eye, its length $\frac{1}{2}$ head; mandible somewhat projecting, with a knob at tip; the middle teeth on a raised base which fits into the emargination of upper jaw; interorbital space as wide as eye, which is 4 in head; space between parietal ridges concave; both jaws, preorbital, maxillary, mandible, and snout scaly, scales on lower jaw smooth; preorbital rather narrow, with 2 spines; preopercular spines long and sharp. Dorsal fin deeply emarginate, its spines rather high, nearly as high as soft rays, longest $2\frac{1}{2}$ in head; caudal fin lunate; pectoral fin long, reaching to tips of long ventrals, past vent; base of pectoral narrow, about as broad as eye; second anal spine strong, nearly as long as third, 3 in head. Gill rakers very long and slender, nearly $\frac{2}{3}$ diameter of eye; accessory scales numerous, especially on head. Bones of skull thick; parietal ridges quite strong, ending in a spine; preocular, supraocular, postocular, and tympanic spines present, thin, sharp, and slender, their ridges weak; parietal bones well separated, interorbital space convex (concave on each side of center), broad, $3\frac{1}{5}$ in base of skull in adult; mesethmoid processes not elevated, ventral process of basisphenoid rudimentary; base of skull markedly curved. Ground color light olive gray, profusely blotched with bright clear orange red or with light orange yellow, the red shades predominating above, the pale below; belly nearly white; top of head with cross blotches and marblings of orange, alternating with pale; sides of the head flesh colored, with 3 bright orange bands radiating from eye; maxillary with orange touches; lips pale, tinged with blackish; inside of mouth pale; dorsal fin with membrane bright orange, a large black blotch occupying membranes between seventh and tenth dorsal spines; this spot is usually distinct, but in old examples sometimes obsolete; pectorals light red, mottled with yellowish; other fins all bright orange, without dusky tips, slightly mottled with paler at base; lateral line running in a distinct continuous light-gray streak, which is not crossed by the red markings; old specimens sometimes with large inky blotches on different parts of the body; peritoneum pale. Length 25 inches. Pacific coast of the United States, from San Diego to Puget Sound; one of the most abundant species; constantly found in the markets. (*pinniger*, large-finned.)

Sebastodes rosaceus, Ayres, Proc. Cal. Ac. Sci., ii, 1862, 216, fig. 62; not *Sebastes rosaceus*, Girard.

Sebastosomus pinniger, Gill, Proc. Ac. Nat. Sci. Phila. 1864, 147, San Francisco.

Sebastichthys pinniger, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 72.

Sebastodes pinniger, Jordan & Gilbert, Synopsis, 662, 1883; Eigenmann & Eigenmann, Proc. Cal. Ac. Sci. 1890, 16; Cramer, Proc. Cal. Ac. Sci., series 2, v, 1895, 595, pl. 59, fig. 7.

2196. SEBASTODES MINIATUS (Jordan & Gilbert).

(Rasciera; Rasher.)

Head 2¾; depth 3; pectorals 3½. D. XIII, 14; A. III, 7; scales 47. Body oblong, the form much as in *Sebastodes pinniger;* head moderate, somewhat pointed; mouth rather large, the maxillary reaching past pupil, its length 2 in head; premaxillary on level of lower edge of pupil; lower jaw projecting somewhat beyond upper, with a moderate symphyseal knob; middle of lower jaw elevated, fitting into an emargination of the upper. Head more completely scaly than in related species, the scales rougher, the scales on the preorbital and head generally being fully ctenoid; mandible scaled even to the symphyseal knob, its scales always roughly ctenoid; interopercle fully scaled; most of the branchiostegals with series of scales; maxillary, preorbital, and tip of snout fully scaled; preorbital with a narrow neck; interorbital space very broad, with a slight depression on each side of a median ridge; preopercular spines rather long and sharp, the second the longest, the spines radiating. Gill rakers, as in *S. pinniger*, very long and slender, the longest about ⅔ diameter of the eye. Dorsal fin low, rather deeply emarginate, about as in *S. pinniger*, but rather higher, the soft rays higher than the spines; caudal fin slightly emarginate; anal fin rather high, the second spine about as long as third and stouter, little more than ½ the height of soft rays, about 3 in head; pectoral fin moderate, the tip reaching about to vent, the base rather narrow; ventrals very long, usually reaching past vent, almost to the beginning of the anal. Bones of skull thick; parietal ridges low but broad, ending in spines; preocular, supraocular, postocular, and tympanic spines present, sharp, broad at base, their ridges weak; parietal bones widely separated; interorbital space convex (nearly flat), broad, 3 in base of skull; ventral process of basisphenoid partly developed; mesethmoid processes well developed, compressed, not elevated; base of skull (parasphenoid) strongly curved. Color above, deep vermilion, mottled with flesh color on sides, belly light red; back and sides everywhere with clusters of black dots, so that the whole body has a dusky shade; top of head and back with vaguely defined cross blotches made of dark points; 3 obscure orange stripes radiating from the eye; maxillary with a red streak; lips red, mottled with blackish; under side of head light red, mottled with darker; inside of mouth red; fins all bright vermilion; spinous dorsal spotted with olive gray below, the membrane posteriorly edged with blackish; soft dorsal spotted below with blackish, a vertical dark-olive streak on each membrane; other fins tipped with blackish, the membranes more or less dotted; no black blotch on the spinous dorsal. Length 24 inches.

Coast of California, San Francisco to San Diego; common in the markets; the bright red coloration different from that of all other species. (*miniatus*, vermilion.)

Sebastichthys miniatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 70, Monterey. (Coll. Jordan & Gilbert.)

Sebastodes miniatus, JORDAN & GILBERT, Synopsis, 663, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 595, pl. 59, fig. 8.

Subgenus ZALOPYR, Jordan & Evermann.

2197. SEBASTODES ALEUTIANUS, Jordan & Evermann, new species.

Head $2\frac{3}{5}$; depth 3. D. XIII, 13; A. III, 8; scales 55. Gill rakers 4+20. Eye 4 in head; maxillary $2\frac{1}{10}$; snout 4; interorbital space 4; pectoral $1\frac{3}{5}$; ventral $1\frac{5}{6}$; third dorsal spine $3\frac{3}{4}$; soft dorsal rays $2\frac{1}{3}$; second anal spine $3\frac{3}{4}$; soft anal rays 2; caudal $1\frac{9}{10}$; longest gill raker $\frac{1}{2}$ eye. Body rather deep, the back arched, the anterior profile stiff and nearly straight; top of head broad and flattish. Interorbital space very broad with a low naked ridge on either side midway between eye and median line; space on each side of each ridge concave. Nasal spine sharp; preocular spine short and sharp; supraocular ridge low, its spine inconspicuous, but present; postocular spine similar, but larger; tympanic similar and still larger. Frontal ridge on either side naked, without spine, but with the short sharp coronal spine behind it, and continuous with it under the scales. Occipital ridge sharp, rather low, ending in a low spine, and with sometimes 1 or 2 spines on its upper surface; a low cross furrow separating the occipital from the sharp, short, nuchal spine. A sharp, short spine on the orbital rim at base of suborbital stay; 3 others on the orbital rim before it; 3 on the lower edge of the preorbital. Post-temporal with 2 or 3 spinous points, a sharp spine behind it above angle of gill opening; a flat spine on the humerus. Opercle with 2 strong spines diverging, each arising from a ridge on the bone. Two spines at junction of subopercle and interopercle. Preopercle with 5 radiating spines, the second longest, $3\frac{1}{2}$ in eye. Space between occipital spines nearly flat. Posterior nostril twice as long as anterior. Lower jaw with 4 large mucous pores on each side, lower jaw projecting, the symphysis thickened. Scales rather large, rough ctenoid, deciduous; rough scales on middle of maxillary, and almost all parts of lower jaw. Dorsal spines low, slender; soft dorsal higher. Second anal spine somewhat shorter than third, the soft rays high. Pectoral rather long, not quite reaching vent, but beyond tips of ventrals. Caudals slightly lunate. Color plain uniform brick red, the edge of dorsal, anal, caudal, and ventral blackish; pectoral without dusky shade; traces of 3 dusky shades across cheeks and opercles; inside of mouth and gill opening coppery red; peritoneum silvery. Aleutian Islands to Kadiak; probably common in water of moderate depth. This strongly marked species is the type of a distinct subgenus, *Zalopyr*, Jordan & Evermann, characterized by the spinous suborbital and the increased number of cranial spines. The species * is here described from 4 specimens,* $1\frac{1}{2}$ to 2 feet long, dredged in 110 fathoms in Shelikof Strait, Alaska, off Karluk, Kadiạk Island, July 20, 1897. (Coll. *Albatross.*) It is nearest *Sebastodes miniatus*, but differs from that and all other American species in the increased number of cranial spines, and especially in the presence of spines below the eye. It is evident that this is the red species wrongly identified by Pallas as the adult of his *Perca variabilis*, the *Epinephelus ciliatus* of Tilesius. One of Pallas's specimens from the Aleutian Islands has been examined by Dr. Jordan in Berlin and described under the name, doubtless erroneous, *Sebastodes matzubaræ*, the true *matzubarræ* being a Japanese species.

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* Specimens probably of this species have been taken in stomachs of the fur seal (*Callorhinus alascanus*, Jordan & Clark) about Kadiak. It is said that this species and *Sebastodes ciliatus* are occasionally taken in salmon nets at Karluk, on Kadiak Island.

Perca variabilis, PALLAS, Zoogr. Rosso-Asiat., III, 241, 1811, Aleutian Islands; in part; the supposed adult or summer form. (Specimen, No. 8145, Mus. Berl.)

Sebastodes matzubaræ, JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 291; JORDAN, Cat. Fish. N. A., 108, 1885; probably not *Sebastes matzubaræ* HILGENDORF, Sitzgber. Ges. Naturf. Freunde, Berlin, 1880, 170, from Yesso.

2198. SEBASTODES ATRORUBENS, Gilbert, new species.

Head $2\frac{5}{7}$; depth $2\frac{8}{9}$. Snout $4\frac{2}{5}$ in total length of head; eye 4; interorbital width 5; least width of preorbital $2\frac{1}{3}$ in pupil. D. XIII, 14; A. III, 7; P. 17; oblique rows of scales above lateral line 45. Body deep, compressed, its greatest thickness about $\frac{1}{2}$ its greatest depth. Caudal peduncle very deep, compressed. its least depth about $\frac{1}{3}$ greatest depth of body, and greater than length of peduncle behind base of dorsal fin. Head wide, heavy, its upper profile descending in a gently convex curve from front of dorsal, the occipital area slightly depressed. but not transversely flattened. Interorbital region and occiput strongly convex transversely, the former with a shallow channel running parallel with each orbital margin. Lower jaw projecting beyond the upper, the tip entering the profile. No symphyseal knob. Maxillary reaching a vertical drawn midway between hinder margin of the eye and back of pupil, its length, measured from tip of snout, equaling length of snout and eye, and $\frac{1}{2}$ length of head to end of upper opercular spine. Preopercular spine short, regularly radiating, the second and third longest diverging, the uppermost very short, about equaling the fourth. Preorbital with 2 very wide strong spines directed downward and backward. Cranial ridges low and inconspicuous, but evident throughout and terminating in strong spines. The nasal, preocular, postocular, and parietal alone are present. Gill rakers long and slender, 9+22 on anterior arch, the longest $2\frac{1}{5}$ in orbit. Dorsal spines high, slender, flexible, the fourth, fifth, and sixth equal in their height, which equals length of snout and eye. Outline of the spious dorsal regularly convex, much as in *Perca*. Membranes not deeply incised. A deep notch between dorsals, the twelfth spine contained 2⅖ times in the fourth; soft dorsal higher than spinous dorsal, the longest rays slightly more than ½ length of head; caudal evenly rounded, 1⅗ in head; anal spines graduated, the second not stronger than the third, contained 1¼ times in its length; third spine 2⅓ in head; longest soft ray 1⅗; ventrals reaching vent, 1⅗ in head; pectorals reaching beyond vent, nearly to opposite first anal spine, the 8 lower rays much thickened, simple and undivided; base of pectorals wide, 3¾ in head. Scales on sides of body weakly ctenoid, feeling smooth to the touch, those on breast minute; no accessory scales on body; head very completely scaled, including top of head as far forward as nasal spines, entire suborbital ring, exposed portion of maxillary, and the mandible; accessory scales numerous on sides of head; scales on maxillary and mandible minute, smooth, partially embedded; soft dorsal, anal, and caudal densely enveloped in minute scales to their tips, the scales equally present on rays and membranes; ventral rays scaled on anterior face, the membranes naked; the lower thickened rays and the upper 4 or 5 rays of pectoral scaled at base only, the others scaled to tip; axillary side of pectorals naked. The general color, when fresh, reddish orange, much mottled on back and upper part of sides with dark brown; dorsal, anal, and caudal dusky orange, with darker membranes; pectorals and ventrals dusky; lining of gill cavity and peritoneum, bright silvery white; opercular flap orange, preceded by a dark blotch; 3 faint dark streaks on side of head, 1 running lengthwise of maxillary, 1 from the narrow suborbital across the cheek to the fourth preopercular spine, a third from eye backward and downward to base of upper 2 preopercular spines; snout and mesial portion of lower lip dusky; top of head mottled with brown and orange red; 4 inconspicuous round spots of clear orange along back, 1 under third and fourth dorsal spines, 1 under seventh and eighth, 1 under origin of soft dorsal, the last under its terminal rays. Most nearly related to *S. atrovirens*, having a strongly convex interorbital space; strong, low, cranial ridges ending in short, strong spines, of which the postocular and nuchal are wanting. Caudal convex. It differs most conspicuously in its red color, strongly protruding lower jaw, and very long slender gill rakers. Length about a foot. Coast of California; known from 1 specimen, probably from Monterey.

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* The following description is from a specimen in the Berlin Museum brought by Pallas from the Aleutian Islands: "D. XIII, 14; A. III, 7. Spines of head low, developed about as in *Sebastodes miniatus* and *pinniger*. Preocular, supraocular, postocular, tympanic, occipital, and nuchal spines distinct; a pair of small coronal spines present, as also a small spine before and one just below eye. Maxillary reaching to posterior border of eye $1\frac{4}{5}$ in head. Both jaws covered with rough, ctenoid scales. Interorbital space flattish, scaled, its breadth a little less than that of eye. Preopercular spine short, simple. Preorbital spines simple. Lower jaw scarcely projecting. Second anal spine scarcely longer than third. Longest dorsal spine $2\frac{3}{4}$ in head, a little less than the longest short rays. Pectoral $4\frac{1}{5}$ in body. Color chiefly red; 3 dark shades across cheek."

Sebastodes atrorubens, GILBERT MS. (Type, No. 1873, L. S. Jr. Univ. Mus., from San Francisco market.)

2199. SEBASTODES ATROVIRENS (Jordan & Gilbert).

(GARRUPA.)

Head 3; depth 2⅘. D. XIII, 14; A. III, 6; scales 52. Bones of skull thick; parietal ridges moderate, ending in spines, supraocular spine absent; preocular and postocular spines present, sharp, slender, the ridges little developed; tympanic sometimes present, small. Parietal bones widely separated; interorbital space nearly 3½ in base of skull, nearly flat, a median depression between 2 ridges, covering mucous canals; ventral process of basisphenoid rudimentary, sometimes fairly well developed, mesethmoid processes compressed, slightly elevated; base of skull (parasphenoid) strongly curved. Body oblong, not tapering rapidly backward; head moderate, rather pointed; mouth moderate, the lower jaw somewhat projecting, the maxillary extending to beyond posterior border of pupil, its length 2 in head; premaxillary below pupil; eye large, 3½ in head; nasal spines prominent; preorbital very narrow, with 2 stout spines; preopercular spines short, rather sharp, the second longer and slenderer than the others; opercular and suprascapular spines sharp; interorbital space widened backward, its width less than that of the eye and more than the length of the parietal ridge; gill rakers slender, not very long, the longest ⅓ diameter of eye; preorbital scaly; maxillary partly scaly; mandible with some smooth scales; scales large, regularly arranged. Dorsal fin rather deeply emarginate, the spines moderate, the fifth ½ length of head and lower than soft rays; caudal truncate; anal fin short and high, its spines slender, the second shorter than third, and not much stronger, about 2½ in head; longest soft rays 1½ in head; pectorals long and narrow, reaching past vent nearly to beginning of anal, their length ⅞ that of head, their base narrow; ventrals long, reaching just past vent. Olive green, marbled with darker, sometimes brownish; belly pale yellowish green; fins olivaceous, no red anywhere. Length 15 inches. Coast of California, San Diego to San Francisco; generally abundant, especially southward. (*ater*, black; *virens*, green.)

Sebastichthys atrovirens, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 289, Monterey. (Coll. Jordan & Gilbert.)

Sebastodes atrovirens, JORDAN & GILBERT, Synopsis, 662, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 595, pl. 60, fig. 10.

Subgenus EOSEBASTES, Jordan & Evermann.

2200. SEBASTODES SAXICOLA (Gilbert).

Head 2⅖ to 2⅔; depth 3 to 3¼. D. XIII, 12 or 13; A. III, 7; lateral line with 45 pores; eye large, 2¾ to 3¼ in head, much longer than snout or interorbital width; mouth large, maxillary reaching nearly to posterior margin of pupil, 2¼ in head. Mandible laterally included, the tip strongly projecting, with conspicuous symphyseal knob, which enters profile. The least width of interorbital space about equaling snout, 5 in head; preorbital narrow, ⅓ pupil, with 2 strong triangular lobes with spinous tips; preopercular spines directed backward, or the lowest slightly oblique. Gill rakers long and slender, the longest ⅖ orbit, constantly 10+22 or 23. The second anal spine varies somewhat in length, always extending slightly beyond tip of third anal spine when the fin is declined, usually not reaching tips of soft anal rays, its length 2⅕ to 2⅓ in that of head. Young individuals with faint dark bars occupying usual position; a jet-black blotch on middle of soft dorsal with a light streak below it separating it from the back. Highest dorsal spine 2½ in head, the spines moderately strong, the membrane not deeply incised; height of soft rays about equaling that of spines; caudal emarginate; second anal spine longer and stronger than third, and longer than soft rays, 2 to 2⅓ in head; ventrals usually not to vent; pectorals nearly to front of anal. Scales rough ctenod on breast, maxillary, mandible, and snout. Bones of skull thin, preocular, postocular, tympanic, and parietal, and sometimes nuchal spines present, small, sharp, the ridges moderately developed; preocular ridge prominent, the spine projecting above orbit; parietal ridges somewhat curved, parietal bones not meeting; interorbital space wide, 3¾ in base of skull, a little concave, nearly flat between the supraocular ridges; ventral process of basisphenoid fairly developed; mesethmoid processes small, compressed, not elevated, base of skull strongly curved. Olivaceous above, silvery below, overlaid below with light red; young with 3 or 4 brownish black bars on side, becoming faint in older examples and sometimes also in young; in these a dusky blotch on occiput, 1 including front of dorsal and 1 on back of tail; dorsal sometimes with black spots, the spinous portion often with a submedian band of black, above which the incised membrane is white; conspicuous olive-brown spots on caudal, usually confined to base and upper lobe of fin; peritoneum black; buccal and gill cavities white. Length 12 inches. Very abundant in deep waters off the coast of southern California; Santa Barbara Islands, in from 44 to 155 fathoms. (Gilbert.) (*saxum*, rock; *colo*, I inhabit.)

Sebastichthys saxicola, Gilbert, Proc. U. S. Nat. Mus. 1890, 78, Santa Barbara Islands. (Coll. *Albatross.*)
Sebastodes saxicola, Cramer, Proc. Cal. Ac. Sci., series 2, v, 1895, 596, 60, fig. 12.

2201. SEBASTODES CRAMERI, Jordan.

Head 2⅔; depth 2⅘. D. XIII, 14; A. III, 7; P. $19\frac{9}{10}$; pores in lateral line, 48 (+ 1 on caudal); transverse rows of scales 49. Body compressed, its thickness 2¼ in its depth. Interorbital space flat, 4½ in head; cranial ridges low but evident, the parietal ridges thin. Preocular, supraocular, postocular, tympanic, parietal and nuchal spines present, the last-named spines being marked off from the parietal ridges only by depressions, and the parietal spines not well marked. Orbit nearly circular, 3⅕ in head. Snout about equal to interorbital width; preorbital with 2 triangular lobes, but no distinct spines. Maxillary reaching a little beyond vertical from middle of eye, 2⅓ in head. Mandible scarcely projecting, with a small symphyseal knob. The 3 upper preopercular spines nearly equal, a little divergent, the lowest one obsolescent. Opercular spines moderate, nearly equal. Gill rakers slender, 2⅓ in orbit, 21 on horizontal limb of first arch. Scales of medium size, those on opercles and cheeks ctenoid, those on snout, preorbital, maxillary, and mandible scarcely ctenoid, or cycloid; accessory scales in moderate number. Dorsal spines rather low, the fourth longest, 2⅔ in head, the twelfth about ½ as long; the membrane of spinous dorsal rather deeply incised; longest dorsal rays about equal to longest spines; second anal spine about equal to the third, but stronger, curved, 3 in head, about 1¼ in soft rays; caudal emarginate; base of pectoral 2⅔ in head, the 10 lower rays simple, the middle rays longest, 3⅖ in length of body, and reaching a little beyond origin of anal; ventrals reaching a little beyond vent. Color in alcohol, yellowish, darker above (doubtless bright red in life); 4 short faint cross bands on upper part of sides, 1 under second, third, and fourth dorsal spines, a second under sixth and seventh spines, a third under ninth, tenth, and eleventh spines, and the fourth under the soft dorsal; a black spot on upper part of opercle; membrane of spinous dorsal black-edged; dorsals and pectorals a little dusky, fins otherwise pale; inside of mouth a little dusky at the sides and in front of tongue; inside of gill cavities dusky in front of pseudobranchiæ; peritoneum dark brown. Coast of Alaska; only the type, $6\frac{1}{4}$ inches long, known. (Named for Mr. Frank Cramer, of Leland Stanford Jr. University, in recognition of his work on the genus *Sebastodes.*)

Sebastodes crameri, JORDAN, Proc. U. S. Nat. Mus. 1896, 451, coast of Oregon, at Albatross Station 3091, Lat. 45° 43′ N., Long. 124° 12′ W., in 87 fathoms. (Type, No. 47745. Coll. Gilbert.)

2202. SEBASTODES SEMICINCTUS, Gilbert.

D. XII–I, 13; A. III, 7. Head $2\frac{9}{10}$ to 3; body slender, the depth $3\frac{2}{5}$ to $3\frac{3}{5}$ in length. Mandible with a moderate symphyseal knob, which projects to enter the profile. Maxillary scarcely reaching vertical from middle of pupil, $2\frac{2}{5}$ to $2\frac{3}{5}$ in head. Eye averaging smaller than in *S. saxicola*, $3\frac{1}{4}$ to $3\frac{1}{2}$ in head (rarely 3 in head). Interorbital space of moderate width, flat, with a slight median lengthwise groove bounded by a pair of low rounded ridges, the groove and ridges sometimes not evident. Preocular, supraocular, and occipital ridges low, but sharp and evident, terminating in strong though slender spines. Nasal, preocular, postocular, tympanic, and occipital spines present, the preocular the strongest, directed outward and backward so as to project over the orbit. Parietals not in contact; preorbital narrow, with 2 triangular or rounded lobes, with or without slight spinous tips. Preopercular spines with compressed triangular base, the upper 2 usually nearest together, directed backward or slightly upward, the others backward and downward; a subopercular and an interopercular spine closely approximated; 3 humeral spines. Gill rakers long, slender, very numerous, developed as movable rakers to the extreme anterior end of the arch; 10 or 11 gill rakers on vertical limb of anterior arch, 27 on horizontal limb, the longest slightly less than diameter of eye. Fifth dorsal spine highest, $2\frac{1}{4}$ to $2\frac{1}{2}$ in head, longer than the soft rays, the membranes between spines not deeply incised; the notch between dorsals rather shallow, the twelfth spine $\frac{3}{4}$ to $\frac{4}{5}$ length of thirteenth; caudal emarginate; second anal spine strong, longer than third, usually not reaching tips of soft rays when fin is declined; length of second spine $\frac{1}{2}$ that of head; ventrals usually reaching to or beyond vent; the pectorals varying from slightly behind vent to slightly behind origin of anal. Scales on breast cycloid or weakly ctenoid, elsewhere on body rough ctenoid; head completely scaled, the scales on top of head and on cheeks ctenoid, those on snout, maxillary, mandible, and branchiostegal rays much reduced in size and smooth, 46 to 48 tubes in the lateral line; about 95 vertical transverse series above the lateral line, each series under the dorsal fins containing 7 or 8 scales. Color in spirits, light brownish above, silvery on lower half of sides and below (tinged with red in life); snout and top of head dusky; sometimes a dusky streak from tip of snout to eye, a second one crossing between preocular ridges, and a third, less often visible, on occiput; a diamond-shaped brown blotch on nape and under front of spinous dorsal, extending downward nearly to lateral line; a small blotch under sixth and seventh dorsal spines; a very conspicuous saddle-shaped brown cross bar under the eighth to eleventh spines; this is wider and lighter next the back, becomes narrower and more intense just above the lateral line, then widens into an intense vertically elliptical blotch on middle of sides; a similar less intense bar under soft dorsal, and 1 on caudal peduncle; the lighter portions of these bars showing darker spots and mottlings; those beneath the fins encroaching somewhat on their basal portions; membranes of dorsal fins with ill-defined roundish spots of light brown; caudal rays with a few elongate olive-brown spots, some of these often forming a vertical series near base of fin; membranes between the rays largely olive-brown on basal ¾ of fin; a faint dark spot above middle of base of pectoral; pectorals, ventrals, and anal white, unmarked; mouth and gill cavity white; peritoneum brown. Length 7 inches. Very closely related to *S. saxicola*, from which it differs conspicuously in its smaller size, its sharply defined cross bars, the smaller head, smaller mouth, and smaller eye, and in the longer, more numerous gill rakers. Coast of California; taken rather abundantly in the Santa Barbara Channel, and at first confused with the young of *S. saxicola*. Specimens are from *Albatross* Stations 2949 and 2959, in depths of 155 and 55 fathoms. (Gilbert.) (*semi*, half; *cinctus*, banded.)

Sebastodes semicinctus, GILBERT, Proc. U. S. Nat. Mus. 1896, 449, pl. 53, fig. 1, Santa Barbara Channel, Lat. 33° 57′ N., Long. 119° 53′ 30″ W., in 155 fathoms. (Type, No. 47581. Coll. *Albatross*.)

2203. SEBASTODES DIPLOPROA (Gilbert).

Head 2½; depth 2¾. D. XIII, 12 or 13; A. III, 7; 35 pores in lateral line. Maxillary reaching beyond middle of pupil, 2⅗ in head; premaxillary produced on each side of median line, forming 2 forwardly projecting dentigerous lobes, in the deep emargination between which fits the tip of mandible; symphyseal knob small. Eye large, 3 to 3½ in head. Preorbital narrow, ⅓ pupil, with 2 strong diverging spines; interorbital space 1⅔ in orbit; preopercular spines strong, the second usually the longest, the third, fourth, and fifth directed downward and backward; opercular spines longer than those on preopercle; 2 small spines on shoulder. Gill rakers long and very slender, the longest ½ orbit. Dorsal spines moderate, longer than soft rays, the longest 2½ in head, the twelfth ⅖ its height; caudal emarginate; second anal spine longer and stronger than third, shorter than soft rays, 2½ to 3 in head; ventrals barely reaching vent, the pectorals slightly beyond, 1⅔ in head, with broad base, the lower rays not thickened. Scales large, minutely spinous and readily deciduous, very small and cycloid on maxillary, mandible, and breast. Fin membranes thick and scaled. Bones of skull thin, cranial ridges moderately developed, parietal ridges markedly curved; preocular, postocular, tympanic, and parietal spines present, mostly thin and sharp; parietal bones meeting; interorbital space 4 in base of skull, concave, the flat center bordered by 2 ridges (the roofs of the mucous canals); the supraocular ridges forming an elevated border; mesethmoid processes compressed, not elevated, ventral process of basisphenoid partly developed; base of skull strongly curved. Uniform rose-red above, bright silvery on sides and below, sparsely black punctate, a faint dusky bar behind pectorals; spinous dorsal with dusky margins, the fins otherwise unmarked; peritoneum jet-black. Coast of southern California; many specimens, the largest described 7 inches long, from about the Coronado Islands, in 24 fathoms. (Gilbert.) (*δίπλοος*, double; *πρόρα*, a prow.)

Sebastichthys diploproa, GILBERT, Proc. U. S. Nat. Mus. 1890, 79, Coronado Islands, Lat. 32° 44′ 20″ N., Long. 117° 23′ W., in 124 fathoms. (Type, No. 48238. Coll. *Albatross.*)
Sebastodes diploproa, CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 596, pl. 61, fig. 13; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 467.*

2204. SEBASTODES AURORA (Gilbert).

Head 2½; depth 2¾. D. XIII, 13 or 14; A. III, 6; lateral line 29 (pores); eye large, 3⅓ in head, much longer than snout or interorbital space. Mouth large, maxillary nearly reaching vertical from posterior margin of orbit, 2¼ in head, its width equaling diameter of pupil. Mandible, laterally as well as in front, largely shutting within the wide premaxillary band of teeth; bands on vomer and palatines also wide. Preopercular spines regularly radiating, the upper 4 more nearly equal than usual. Preorbital wider, its least width ⅖ pupil, with 2 strong triangular spines, directed downward and backward. Gill rakers slender, the longest little more than ⅓ eye. Dorsal spines strong, not high, the longest 2½ in head, the twelfth about ⅓ its height; soft rays lower than spines; caudal slightly emarginate; second anal spine very strong, much longer and stronger than third, and about equaling in length the soft rays, its length about 2½ in head; ventrals reaching to or slightly beyond vent; pectorals to front of anal. Scales very rough ctenoid, those of lateral line enlarged, covering breast, branchiostegal rays, mandible, maxillary, and part of snout, everywhere rough. Fins enveloped in a more or less lax membrane, invested with fine ctenoid scales. Bones of skull very thin; preocular, supraocular, postocular, tympanic, parietal, nuchal, and usually coronal spines present, sharp and slender; ridges moderate; parietal ridges high, thin; parietal bones not meeting; interorbital space narrow, long,

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* Upon these specimens Dr. Gilbert makes the following remarks:

"All these show the characteristic silvery-white coloration on lower half of sides. There are traces of dark bars on the sides; 1 on nape and under front of spinous dorsal; 2 on sides diverging downward from behind middle of spinous dorsal; 1 under middle of soft dorsal. There are corresponding dusky marks on the fins, that on soft dorsal being a distinct blackish blotch. The projecting lobes of the premaxillaries are evident in the youngest individuals. Fins and spines of head about as in adults.

"The gill rakers in this species are 9 or 10 + 23 to 25. The maxillary is 2⅓ to 2½ in head. The interorbital space is very slightly more than ½ eye. The ventral fins extend nearly to vent. Pectorals 1⅗ in head. There is considerable variation in the direction of the upper preopercular spines, which are directed sometimes straight forward, sometimes obliquely forward and downward. Lower preorbital spine directed obliquely downward and backward."

4½ in base of skull, ½ diameter of orbit, moderately concave; 2 broad low ridges over the large mucous canals; mesethmoid processes compressed, thin, very little elevated; ventral process of basisphenoid rudimentary, base of skull moderately curved. Gill rakers very large and thick, comparatively few in number, 7 on vertical limb, and 14 or 15 movable ones and about 3 tubercles on horizontal limb of gill arch. The coronal spines are an inconstant feature of this species, absent nearly as often as present. In 1 specimen a slight prominence on 1 side indicates its position. Uniform red, light below; a narrow black streak along edge of spinous dorsal, the triangular incised portions of membrane above it white; a similar mark between second and third anal spines; fins otherwise unmarked; peritoneum black; mouth cavity white. Length 12 inches. About the Santa Barbara Islands, in 233 and 267 fathoms. (Gilbert.) (*aurora*, dawn.)

Sebastichthys aurora, GILBERT, Proc. U. S. Nat. Mus. 1890, 80, Santa Barbara Islands, Lat. 33° 55′ 30″ N., Long. 119° 41′ 30″ W., in 266 fathoms. (Type, No. 48239. Coll. *Albatross.*)

Sebastodes aurora, CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 596, pl. 56, fig. 15; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 467.

2205. SEBASTODES MELANOSTOMUS, Eigenmann & Eigenmann.

The original types of this species are thus described: Head 3¼ in total length; depth about 3. D. XIII, 13½; A. III, 7½; lateral line 43. Body short and deep; head heavy; mouth large, lower jaw projecting, maxillary reaching to below posterior border of pupil; eye very large, orbit 1 in snout, 3⅚ in head; interorbital space slightly depressed, 4¾ in head; preorbital narrow, 3 in orbit, with an anterior simple and a posterior many-pointed spine. Cranial spines low but distinct, smooth, and covered with skin to their tip; the 3 ocular, the tympanic and parietal spines present; opercular and preopercular spines long, simple; maxillary, mandible, preorbital, and snout scaly; scales of opercle rather large; scales of sides very large, with but few accessory ones. Gill rakers slender, 3½ in orbit. Dorsal spines all very low, the third and fourth the highest, less than an orbital diameter, the soft rays 3 in head; anal spines graduated, the second not much more than ½ length of soft rays. Body scarlet, shading into madder brown or blackish red above lateral line; fins vermilion, the first dorsal with its membranes narrowly black-edged; all other fins more or less black on posterior half, the caudal most so; head vermilion, tinged with black; inside of mouth and gill cavity almost wholly black; upper posterior portion of gill membranes black; a black bar above opercle; peritoneum black. Length about 22 inches. Point Loma, California. (*μέλας*, black; *στόμα*, mouth.)

Sebastodes melanostomus, EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci., series 2, III, 1890, 17, Point Loma, near San Diego, California. (Coll. C. H. Eigenmann.)

2206. SEBASTODES INTRONIGER (Gilbert).

Head 2½; depth 2⅘; eye 3⅓ to 4 in head. D. XIII, 14; A. III, 7 or 8; P. 18; lateral line 36. Mouth large, the maxillary reaching to middle or posterior third of eye, 2 in head, its greatest width ⅓ its greatest length.

Mandible protruding, entering profile in large specimens, less prominent in the young. Symphyseal knob present, but not conspicuous. Teeth on jaws, vomer, and palatines in narrow bands. Eye large, longer than snout. Interorbital space slightly concave, with 2 evident longitudinal ridges. Cranial ridges sharp-edged and moderately elevated, the spines strong. Nasal, preocular, supraocular, postocular, tympanic, coronal, parietal, and nuchal spines present; 1 or both coronal spines occasionally wanting. Preorbital of moderate width, its anterior lobe sometimes ending in a spine, the posterior with a sharp spinous edge bearing 1 to 4 sharp points. Preopercular spines large, regularly radiating, the 2 upper ones approximated and more slender, the others broadly triangular, directed downward and backward. Two spines sometimes present at angle of subopercle; opercular spines sometimes double. Lower rim of orbit sometimes serrated. Gill rakers long and slender, the longest $\frac{1}{3}$ diameter of eye, 22 or 23 on lower limb of outer arch. Spinous dorsal rather low, the twelfth spine $\frac{1}{2}$ the height of the last, which is $\frac{1}{5}$ head; the longest spine $2\frac{1}{2}$ in head; second anal spine stronger, but scarcely longer than the third $2\frac{1}{2}$ in head; pectoral without thickened lower rays, reaching to vent, $4\frac{1}{5}$ in body; caudal emarginate. Scales large, ctenoid, about 30 tubes present in the lateral line; small accessory scales numerous; all parts of the head, including cheeks, maxillary, mandible, branchiostegal rays, snout, and interorbital space covered with scales; gular region scaled; all the fins invested to their tips with fine scales; scales large, ctenoid; fins scaled. Cranial ridges and spines rather low but strong; coronal and nuchal spines present; mandibular symphysis prominent, with small symphyseal knob; peritoneum, mouth, and gill cavity black or dusky. Color uniform bright red, duller than in *S. miniatus*. Smaller specimens reddish. Traces of fine olive-green bars on back; numerous dark spots along lateral line; a dark blotch on opercle; 3 bands on cheek, and a blotch in the axil of pectoral; all the fins edged with black. Several specimens were taken in Bering Sea to the north and west of Unalaska Island, in depths of 85 to 350 fathoms. The species evidently lives at much greater depths than does *S. alutus*. The cranial ridges are well developed and terminate in strong spines. Coronal spines are usually present, but may be absent on one or both sides. In both types of *S. introniger*, taken at a depth of 266 fathoms in the Santa Barbara Channel, California, the coronal spines are wanting, but as they agree with our specimens in all other important details we make the identification without doubt.

The following characters are taken from Alaskan specimens:

Bones of skull rather thin; preocular spines long, sharp; supraocular, postocular, and tympanic spines broad, strong; coronal spines small in Alaskan specimens, wanting in those from California;* parietal ridge high, strong, with 2 spines; parietal and nuchal produced by interruption in parietal ridge, which in some instances shows a slight tendency to break up into a series of spines; the other ridges lower; parietal bones well separated or barely uniting; interorbital space 4 to $4\frac{1}{2}$ in base of skull, flat; mesethmoid processes somewhat compressed, with broad upper surfaces, not elevated; ventral process of basisphenoid rudimentary or a little developed; base of skull moderately curved (less than in *Sebastodes aurora*). Pacific coast of America, in deep water, from the Aleutian Islands, in 85 to 350 fathoms, to Santa Barbara Islands, in 266 fathoms.

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* Types of *Sebastodes introniger*.

Sebastichthys introniger,* GILBERT, Proc. U. S. Nat. Mus., XIII, 1890, 81, Santa Barbara Islands, Lat. 33° 55′ 30″ N., Long. 119° 41′ 30″ W., in 266 fathoms. (Coll. *Albatross*.)
Sebastodes introniger, GILBERT, Rept. U. S. Fish. Comm. 1893 (1896), 407.

Subgenus SEBASTOMUS, Gill.

2207. SEBASTODES RUBERRIMUS, Cramer.

(RED ROCKFISH; TAMBOR.)

Head 3; depth 3⅔; eye 4½. D. XIII, 14; A. III, 7; lateral line about 50. Body oblong, rather deep, not much compressed; head large, blunt, mouth large, maxillary reaching nearly to posterior edge of eye, its length ½ that of head; premaxillary on level of lower edge of pupil; lower jaw a little projecting, the symphyseal knob slight; interorbital space coarsely scaled, with 2 slight ridges anteriorly. Preorbital wide; preopercular spines broad, usually divided, the third multified. Scales on head rough; jaws naked; suborbital stay weak. Gill rakers short, clavate, the longest ¼ eye. Scales on body rough; accessory scales numerous; pectoral short, broad, its length 4 in body; dorsal spines stout, rather low, the fin not deeply notched, the longest spine about as high as the soft rays, 2½ in head; caudal truncate; soft fins scaly; second anal spine little stronger or longer than third, ⅔ height of soft rays, 2⅔ in head. Skull of large adult: Bones thick, spongy, cranial ridges well developed, entirely broken up into spines and tubercles, parietal bones widely separated, interorbital space flat (a compressed longitudinal ridge above mucous canals on frontals), slightly more than 4 in base of skull; ventral process of basisphenoid rudimentary, mesethmoid processes strong, compressed, not elevated, base of skull straight. Skull of young: Ridges well developed, sharp, not at all serrated; preocular, supraocular, postocular, tympanic, and parietal spines all present, sharp; interorbital space deeply concave, 6½ in base of skull; ventral process of basisphenoid partly developed, mesethmoid processes elevated. Color, clear deep vermilion red, paler below; a narrow undulating whitish streak along the sides, from the eye to above the base of the anal, and another along the lateral line; these indistinct in the adult; faint dusky shades radiating from eye; fins red, soft fins always largely blackish at tip, especially in young; young more distinctly marked than adults, which are nearly plain brick red; peritoneum white. Length 30 inches. Pacific coast of the United States, from San Diego to Puget Sound; abundant; reaches a larger size than any of the other species, except possibly *Sebastodes paucispinis;* an important food-fish, varying much with age. (*ruberrimus*, very red.)

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* This species has been identified with *S. melanostomus*, Eigenmann, by Cramer and by Jordan & Evermann. The types of the two have not been compared, and the description of *S. melanostomus* fails to agree in so many details with specimens of *S. introniger* that it seems best to keep the two apart. *S. introniger* has the head larger, 2¾ in total length. The interorbital space is narrower, 5⅕ in length of head. The scales are larger, 34 in the course of the lateral line. The accessory scales are very numerous. The gill rakers are much longer, the longest contained 2⅓ to 2½ times in the diameter of the orbit. The second and third anal spines are equal, or the second slightly the longer, contained 1¼ times in longest anal ray. In *S. melanostomus* the head is 3¼ in total length. There are 43 scales in the lateral line, and but few accessory scales. The gill rakers are contained 3½ times in the diameter of orbit, and the anal spines are graduated, the second "not much more than ½ the length of the soft rays." Two specimens of *S. introniger*, 30 cm. and 44 cm. long, entirely agree in the respects above mentioned. The differences alleged to separate the two species can not, therefore, be due to age. (Gilbert.)

Sebastodes ruber, JORDAN & GILBERT, Synopsis, 665, 1883 (not of AYRES), and of late authors generally.

Sebastodes ruberrimus, CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 597, pls. 62, 63, and 69, Monterey Bay, California. (Coll. Cramer.)

2208. SEBASTODES CONSTELLATUS (Jordan & Gilbert).

(SPOTTED ROCKFISH.)

Head 2½; depth 2½. D. XIII, 13; A. III, 6; lateral line 53. Body robust, heavy forward, tapering into a slender caudal peduncle; head rather pointed in profile; mouth large, oblique, lower jaw slightly projecting beyond emarginated tip of upper jaw, a small knob at the symphysis; maxillary very broad, extending beyond pupil, its middle part with many small scales, its length 2 in head; premaxillary in front just below the level of the eye; mandible almost entirely covered with small rough scales; muzzle and preorbital scaled to tip of snout; head densely covered with small scales. Preopercle with its second spine long and sharp; preorbital wide, its edge lobed. Eye large, 4 in head. Gill rakers short, clavate, the longest of them about ⅕ the diameter of eye. Scales strongly ctenoid, the accessory scales largely developed Dorsal spines rather strong and low, the fourth more than ⅓ the length of head, the fin rather deeply emarginate; soft dorsal rather low, about as high as second anal spine, 2¾ in head, robust, curved, considerably longer than the third or soft rays; caudal slightly emarginate; pectorals rather narrow, reaching beyond ventrals, about to vent, their length ⅔ that of head. Skull long, the bones moderately thick, the preocular, supraocular, postocular, tympanic, and parietal spines present, broad at base, moderately thick and sharp, the ridges strong, high, the parietal ridges curved, with a slight tendency to become serrate and develop small spines; parietal bones widely separated, interorbital space narrow, 6 in base of skull, deeply concave, the supraocular ridges very high, and a deep depression between the ridges over mucous canals; ventral process of basisphenoid strongly developed, mesethmoid processes compressed, thick, elevated; base of skull straight. Orange red; back olive shaded; belly yellowish; cheeks with red and yellowish shades; head and body everywhere closely covered with small roundish pale spots; spots above light-rose color; below larger and nearly white; 4 or 5 roundish rose-colored blotches on back, besides some mottlings of similar shade; the first spot, often obscure, under the fourth dorsal spine, the next near the lateral line under the eighth dorsal spine, the third close to junction of the two parts of dorsal; the fourth under end of soft dorsal; a fifth sometimes near base of eighth dorsal spine;

opercular flap with a rosy spot; fins light reddish; dorsal speckled at base with light and dark; peritoneum white. Length 15 inches. Coast of California, San Diego to San Francisco; abundant in rather deep water, especially southward; a brilliantly colored fish, one of the handsomest of this showy group. (*constellatus*, starred.)

Sebastichthys constellatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 295, Santa Barbara Channel; San Francisco. (Type, No. 26963. Coll. Jordan & Gilbert.)
Sebastodes constellatus, JORDAN & GILBERT, Synopsis, 665, 1883.

2209. SEBASTODES UMBROSUS (Jordan & Gilbert).

Head $2\frac{3}{5}$; depth $2\frac{1}{5}$; eye large, 4 in head. D. XIII, 12; A. III, 6; lateral line 40 (tubes). General form of *Sebastodes constellatus*. Mouth moderate, oblique, lower jaw scarcely projecting, its tip fitting into the emarginate tip of upper jaw; maxillary 2 in head, reaching posterior margin of pupil; each jaw with small, smoothish scales. Cranial ridges rather sharp, lower than in *S. constellatus*; preocular, supraocular, postocular, tympanic, and parietal spines present; interorbital area concave, with 2 prominent ridges, the region much broader than in *S. constellatus*, $\frac{2}{3}$ width of eye; supraocular ridge low, its spine smaller than tympanic spine; preocular spine prominent; preopercular spines all acute; preorbital narrow, with 2 spines. Gill rakers rather long and slender, the longest about $\frac{1}{2}$ eye. Scales moderate, with many accessory scales. Dorsal rather low, deeply emarginate; fourth spine equal to soft rays, about $\frac{2}{5}$ head; soft dorsal longer than high; second anal spine large, $2\frac{1}{2}$ in head; caudal slightly emarginate; pectoral not reaching vent, $3\frac{2}{3}$ in body. Light orange, overlaid everywhere with blackish, the latter color forming on lower part of sides reticulations in fine pattern, the centers of scales being paler than edges; sides of head with dusky shades; sides of back with some large areas of blackish; upper parts with 5 large rounded blotches of pink washed with orange, these blotches arranged as in *S. constellatus*, but larger, less sharply defined, and of a different hue; the second blotch with a smaller one above it; a rosy spot on opercular flap; fins pale orange, shaded with dusky. Length about 18 inches. Coast of California from Point Concepcion to Coronado Islands; scarce. (*umbrosus*, shady.)

Sebastichthys umbrosus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 410, Santa Rosa Island, off Santa Barbara, California. (Types, Nos. 31140 and 31141. Coll. Andrea Larco.)
Sebastodes œreus,* EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci. 1890, 20, Coronado Islands (San Diego market). (Coll. C. H. Eigenmann.)
Sebastodes umbrosus, JORDAN & GILBERT, Synopsis, 950, 1883.

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* *Sebastodes œreus* is thus described: Head $2\frac{2}{3}$ to $2\frac{3}{4}$; depth $2\frac{3}{4}$ to 3. D. XIII, $12\frac{1}{2}$ to 13; A. III, $6\frac{1}{2}$; lateral l. (pores) 37 to 40. Shape of *Sebastodes rosaceus*. Jaws equal, maxillary reaching past pupil, 2 or slightly less than 2 in head. Preorbital narrow, with 3 flat spines; eye large, $3\frac{1}{2}$ to $3\frac{3}{4}$ in head, $\frac{3}{5}$ in interorbital. Cranial ridges high and narrow, terminating in sharp spines; preocular, supraocular, postocular, tympanic, and occipital spines; interorbital concave, with a narrow median groove bordered by narrow ridges. Maxillary and mandible entirely scaled. Highest dorsal spine $2\frac{1}{5}$ in head; second anal spine little longer than third, considerably shorter than rays, $2\frac{1}{3}$ in head. General color (in life) pink, overlaid with bronze; top of head and back above lateral line bronze with 5 pink spots; sides below lateral line finely vermiculated with bronze, which occupies more space than ground color; pink spots of back placed as in related species, not surrounded by green or purple; posterior part of lateral line pink; sides of head bronze (with pink showing through) with an ill-defined streak backward from upper angle of eye; a light pink spot

2210. SEBASTODES ROSACEUS (Girard).

(CORSAIR.)

Head 2⅔; depth 3; eye very large, 3½ in head. D. XIII, 13; A. III, 6; lateral line 48. Body oblong, little elevated; head rather pointed; mouth moderate, the jaws about equal, the lower with a small knob; maxillary not reaching posterior border of eye, its length 2 in head; premaxillaries below the orbit. Maxillary and preorbital partly scaled; mandible and snout naked; preopercular spines short. Gill rakers moderate, longer than in *S. constellatus*, not clavate. Scales moderate, the accessory ones numerous. Dorsal spines rather low and strong, the fourth ⅖ the length of the head, about as high as the soft rays, the fin rather deeply emarginate; caudal slightly notched; anal rather low, with the second spine curved, 2⅓ in head, much longer and stronger than third, shorter than the soft rays; pectoral fins moderate, reaching beyond tips of ventrals, past the vent, 3⅓ in body. Bones of skull thin; preocular, supraocular, postocular, tympanic, and parietal spines present, slender, sharp, the ridges thin, rather high, parietal bones well separated; interorbital space narrow, 5⅕ in base of skull, concave, with 2 small ridges over mucous canals; ventral process of basisphenoid well developed; mesethmoid processes compressed, strongly elevated (at an angle of about 45°); base of skull very nearly straight. Bright orange red, the young strongly tinged or mottled with golden yellow; back with 4 pale spots, arranged precisely as in *S. constellatus*, *rhodochloris*, and *chlorostictus;* these always very distinct, of a rose-pink color, or sometimes almost white; the darker border around them is of a deep purple or blood color, never greenish; fins rosy, mottled with orange; head with radiating stripes of orange and rosy; nape with alternating bars of yellowish and deep red, the colors blending; no decided green, and no small pink spots anywhere; peritoneum blackish. Length 12 inches. Coast of California, San Diego to San Francisco, in rather deep water; the most abundant of the red species, and one of the smallest; coloration very brilliant. (*rosaceus*, rosy.)

Sebastes rosaceus, GIRARD, Proc. Ac. Nat. Sci. Phila., VII, 1854, 146, and in U. S. Pac. R. R. Surv., X, Fishes, 78, pl. 21, 1858 (poor figure, from a specimen in bad condition), San Diego; San Francisco (Coll. A. Cassidy and Dr. Newberry); GÜNTHER, Cat., II, 98.

Sebastes helvomaculatus, AYRES, Proc. Cal. Ac. Sci., II, 1859, 26, f. 8, San Francisco. (Coll. W. O. Ayres.)

Sebastodes rosaceus, JORDAN & GILBERT, Synopsis, 666, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 598, pl. 63, fig. 20.

2211. SEBASTODES AYRESII, Gilbert & Cramer.

Head 2⅗; depth 2⅘. D. XIII, 13; A. III, 6; lateral line (pores) 42 to 44; transverse rows of scales 43. Very closely related to *Sebastodes rosaceus*, but the supraorbital ridge lower, thicker, and without spine. Body oblong,

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on upper angle of gill opening; head below orbit pink, with bronze bar through cheek; maxillary pink, with a median bronze streak; membranes of maxillaries chiefly bronze; lower surface of head rose colored; breast yellowish pink, abdomen nearly white; area above anal yellowish; dorsal light bluish pink, clouded with bronze, the rays of all the other fins pink, the membranes bronze. Length about 11 inches. Coronado Islands. (*æreus*, bronze.)

not much elevated, its width about 2 in its depth. Orbit large, 3⅓ in head; snout about 1¼ in orbit. Interorbital space concave, 2 in orbit, with a median groove bordered by a pair of ridges diverging backward. Cranial ridges well developed, the preocular, postocular, tympanic, and parietal spines present, sharp. Mouth moderate, jaws about equal, maxillary about 2⅓ in head, reaching to vertical from posterior border of pupil; the lower jaw with a small symphyseal knob. The upper preopercular spines nearly equal, sharp and long, the third shorter and broad; lower opercular spine horizontal, the upper larger and directed somewhat upward. Gill rakers moderate, the longest about 3 in orbit, 21 on horizontal limb of first arch. Scales moderate, ctenoid, accessory scales numerous, mandible naked; interorbital space, preorbitals, maxillaries, the rays of the dorsal, anal and caudal fins, and the median rays of the pectorals scaly. Fourth dorsal ray longest, about 2⅕ in head, the twelfth about 2½ in the fourth, the dorsal rays shorter than the longest spines; second anal spine much longer and stronger than third, about 2 in head, the rays equal to the second spine; caudal slightly emarginate; pectorals moderate, reaching a little beyond vent, the median rays longest, 3½ in length of body, base of fin a little less than orbit, the 7 lower rays simple, somewhat thickened; ventral rays reaching vent. Color in alcohol, like *S. rosaceus;* dark brownish above, paler below; a small pale pinkish spot immediately under base of fourth dorsal spine, and another small one immediately under base of eighth spine; a third larger spot just above lateral line and under the ninth spine; a fourth spot immediately under the first, and a fifth under the last dorsal rays; peritoneum dark brown, speckled with black dots. Distinguished from *Sebastodes rosaceus* by the absence of the supraocular spine. Length 9 inches. Coast of California. One specimen taken on a trawl line at Cortez Banks, near San Diego. (Named for the late Dr. William O. Ayres, of San Francisco, an excellent naturalist, one of the pioneers in the study of the fauna of California.)

Sebastodes ayresii, GILBERT & CRAMER, Proc. U. S. Nat. Mus. 1896, 450, Cortez Banks, near San Diego. (Type, No. 47744. Coll. *Albatross*.)

2212. SEBASTODES RHODOCHLORIS (Jordan & Gilbert).

(FLY-FISH.)

Head 2½; depth 3. D. XIII, 14; A. III, 6; lateral line 58, the accessory scales very numerous. Body oblong, more elongate than in related species; maxillary 2⅙ in head, reaching beyond pupil; jaws about equal; preorbital narrow. Eye very large, 3½ in head. Preopercular spines long. Gill rakers as in *S. rosaceus;* mandible finely scaled near the base. Dorsal fin moderately emarginate, lower than in *rosaceus*, longest spine nearly 3 in head; soft dorsal as high as spines; caudal slightly notched; second anal spine longer than in any other species, longer than maxillary, higher than soft rays, ½ length of head; pectoral reaching past ventrals, nearly to anal, 3⅔ in body. Skull long and narrow, the bones thin; preocular, supraocular, postocular, tympanic, and parietal spines present, long, slender, sharp, the ridges thin, high, parietal bones well separated, interorbital space narrow, 6 in base of skull, less than length of supraocular ridge, deeply concave, the supraocular ridges high at the sides and a deep depression between the ridges over the mucous canals; ventral process of basisphenoid well developed; mesethmoid processes compressed, thin, elevated, but not as strongly as in *Sebastodes rosaceus;* base of skull straight. Bright, clear rose-red, without trace of purplish; region above lateral line with much deep green in the form of reticulating streaks; below lateral line the green gives place to bright golden yellow similarly mixed with red; top of head with cross bands of green and red; green streaks radiating from the eye; 4 bright pale pink spots on sides of back, arranged precisely as in *rosaceus, constellatus,* and *chlorostictus,* the color brighter than in these, surrounded by rings of green, without any trace of purplish shading; a pink opercular spot; a pale area behind eye; fins all with the rays red, the membranes olive or golden; peritoneum dusky. Length 12 inches. Off Monterey and San Francisco, in deep water; rare. (*ῥόδον*, rose; *χλωρός*, green.)

Sebastichthys rhodochloris, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 144, Monterey Bay, California. (Type, No. 26967. Coll. Jordan & Gilbert.)
Sebastodes rhodochloris, JORDAN & GILBERT, Synopsis, 667, 1883.

2213. SEBASTODES EOS. Eigenmann & Eigenmann.

Head 2½ (3 to 3⅙ in total length); depth 3 (3½ to 3¾). D. XIII, 13½; A. III, 6½; lateral line 37. Body oblong. Lower jaw included, its symphyseal knob strong; maxillary reaching beyond eye, 2 in head. Orbit 1 in snout, little more than 4 times in head, greater than interorbital width. Interorbital deeply concave, grooved medially, 5½ in head. Cranial ridges very high and narrow, ending in prominent spines; preocular, supraocular, and tympanic spines directed outward and backward; postocular upward and backward; occipital ridges in largest specimens 6 mm. high, the region between them depressed; opercular and preopercular spines long and strong. Preorbital little less than ½ width of orbit, with a single, flat, downward directed spine at its posterior angle. Gill rakers all short, the longest ⅕ orbital diameter. Mandible, maxillary, and snout, except a median triangular spot, scaly; accessory scales very numerous on cheeks and opercles. Spinous dorsal deeply incised, the membrane of fifth spine meeting sixth spine near its basal fourth, less deeply incised in smaller specimens, highest spine 2 to 2½ in head; highest dorsal ray 2¾ to 3 in head; second anal spine 2⅔ to 3 in head; highest anal ray 2⅓ to 2½; pectorals reaching to twelfth dorsal spine, 4⅔ to 5 in total length. Color marks all having a washed or faded appearance; body and head intense rose pink; back and dorsal fin indistinctly marked with raw sienna; fins colored like body; 3 pink spots, 1 below origin of soft dorsal, 1 below its end, and 1 above lateral line below ninth dorsal spine; membranes between maxillaries saturn red; peritoneum perfectly white, or more or less dusky. Length about 22 inches. Coast of southern California, Point Loma, San Diego, in 100 fathoms. (Eigenmann & Eigenmann.) (*ἠώς*, dawn.)

Sebastodes eos, EIGENMANN & EIGENMANN, Proc. Cal. Ac. Sci. 1890, 18, Point Loma, near San Diego. (Coll. C. H. Eigenmann.)

2214. SEBASTODES GILLI, Eigenmann & Eigenmann.

Head 3 (3½ to tip of caudal); depth 3 (3½). D. XIII, 13½; A. III, 7½; lateral line (pores) 44 or 45. Snout very broad, blunt. Mouth very oblique, the premaxillary on a level with superior edge of pupil. Orbit 1 in snout, 4⅓ to 4½ in head, a little greater than interorbital; interorbital nearly evenly concave, the median groove shallow; lower jaw projecting and entering profile, without symphyseal knob; profile nearly straight to origin of dorsal fin, not steep; maxillary reaching posterior edge of pupil, 2 in head; preocular, supraocular, postocular, occipital, and nuchal spines sharp; the first 4 very short and broad, the supraocular spine about 2½ in interorbital; occipital spines very high and stout; nuchal spines almost continuous with occipital; opercular and preopercular spines long and strong, the 3 superior preopercular conical, directed backward, the other 2 flat, triangular, downward and backward; preorbital with a sharp, subconical anterior spine, and terminating posteriorly in a similar but larger spine; maxillary with a few scales superiorly on its median third; intermaxillary band of teeth shallow in front, 5 in orbit; snout either naked or with a few scattered patches of scales; mandible entirely naked. Scales strongly ctenoid; accessory scales very numerous everywhere, especially so on cheeks; scales of head slightly ciliate, depressed; membranes of soft dorsal and anal with minute scales on basal half of fins; a few scales basally on spinous dorsal. Vomerine teeth in a V-shaped patch; palatine band of teeth short, 4 in orbit. Gill rakers very short, ¼ to ⅕ orbital diameter, 9+17 or 18. Spinous dorsal low, the highest spine 2⅖ to 2½ in head, the fin deeply notched, the highest ray about equal to highest spine; caudal truncate; second anal stouter and about as long as third. Buccal and opercular cavities and peritoneum white, sparsely dotted with black; ventral surface light geranium red, shading into scarlet on tail; dorsal surface rather closely covered with small bronze, roundish spots, which extend upon the membrane of soft dorsal fin and a few on spinous dorsal; series of confluent bronze spots forming radiating streaks or bands on sides of head, 1 extending from eye to upper angle of gill opening, 1 to tip of lower opercular spine which is continued upon the shoulder as a conspicuous blotch, 1 to lower angle of opercle, 1 downward and slightly backward across cheek; lower lip and anterior part of maxillary dusky; a few conspicuous spots on base of pectoral; all the dark markings becoming blackish and persisting in spirits, the radiating streaks of the head especially conspicuous in the alcoholic specimen; a light spot under last dorsal spine; 1 on opercular flap. Length about 23 inches. Point Loma, near San Diego, California. (Eigenmann & Eigenmann.) (Named for Dr. Theodore Gill.)

Sebastodes gilli, EIGENMANN & EIGENMANN, Amer. Naturalist, Feb., 1891, 154, Point Loma, near San Diego, California. (Coll. Dr. Eigenmann.)

2215. SEBASTODES CHLOROSTICTUS (Jordan & Gilbert).

(PESCA VERMIGLIA.)

Head 2½; depth 2¾. D. XIII, 13; A. III, 6; lateral line 50. Body oblong. Head moderate, profile rather steep, with a nearly even slope. Mouth large, oblique; maxillary reaching to behind the pupil, its length about 2⅕ in head; premaxillary in front below the level of the large eye, which is 3½ in head. Jaws equal in closed mouth, tip of lower fitting into emarginate upper jaw; a rather conspicuous symphyseal knob. Preorbital sinuate. Preopercular spines rather sharp, second longest; opercular spines sharp. Gill rakers long and rather strong, not clavate, the longest about ⅖ diameter of eye, longer than in related species. Scales on head fewer than in *S. constellatus;* snout wholly naked; maxillary partly scaled; mandible naked. Dorsal spines very high, nearly as high as in *vexillaris,* the fourth highest, nearly ½ head, higher than soft rays, which are also considerably elevated; dorsal fin rather deeply emarginate; caudal fin emarginate; anal fin not very high, its second spine much higher and stronger than third, about as high as the soft rays, 2¼ in head; pectorals 3⅓ in length, with moderate base, reaching beyond tips of ventrals, about to vent. Bones of skull thin; preocular, supraocular, postocular, tympanic, and parietal spines present, strong, long, and sharp, the ridges strong and high; parietal bones well separated; interorbital space 4⅔ in base of skull, concave, the ridges over mucous pores high and thin; ventral process of basisphenoid well developed; mesethmoid processes compressed, moderately elevated; base of skull nearly straight. Olivaceous above, sides pinkish and golden; 4 roundish spots of pink placed as in *S. constellatus* and *S. rosaceus,* but less distinct; a pink blotch on opercular flap; upper parts of the body, from just below lateral line, closely covered with small round spots of a clear olive green, these spots most distinct on back and top of head; on sides of body, just above and below lateral line, these spots form 2 continuous series, following course of lateral line; eyes above with green spots; fins nearly plain red; base of dorsal spotted with olive. The preorbital spines can not be used to distinguish this species from *S. eos,* Eigenmann. If the two are distinct, they are distinguishable by the scaliness of the maxillary and mandible, the length of the second anal spine, and the color of the peritoneum. Length 15 inches. Pacific Coast of California from San Diego to San Francisco; abundant in deep water; a very pretty fish. (χλωρός, green; στικτός, spotted.)

Sebastichthys chlorostictus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 294, Monterey Bay, California. (Type, No. 26964. Coll. Jordan & Gilbert.)

Sebastodes chlorostictus, JORDAN & GILBERT, Synopsis, 668, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 599, pl. 63, fig. 21.

2216. SEBASTODES RUPESTRIS (Gilbert).

Head 2½; depth 2⅚ to 3. D. XIII, 13; A. III, 7; lateral line 31 (pores), about 60 vertical series counted above lateral line. Eye 2⅘ in head, longer than snout or interorbital space; the latter narrow, concave, without ridges, the least width ½ orbit. Maxillary reaching beyond middle of pupil, 2¼ in head; jaws equal, tip of lower jaw scarcely projecting; teeth in very narrow bands in jaws and on vomer and palatines. Preorbital very narrow, its least width less than ¼ pupil, lobate and without spines. Supraocular ridge short; nasal, preocular, supraocular, postocular, tympanic, occipital, and nuchal spines present, the ridges of moderate height, but the spines, especially postocular and tympanic, strong; preocular ridge but little conspicuous, the spine much smaller than in *Sebastodes sinensis* and *Sebastodes zacentrus.* Spines on shoulder little developed; opercular spines rather weak; preopercular spines small, the 2 upper directed backward, the others downward and backward. Dorsal fins not deeply notched, the longest spine 3 in head, the twelfth ½ its length; soft dorsal not high; caudal truncate; second anal spine longer and stronger than third, as long as soft rays, but not reaching their tips when the fin is declined, 2⅔ in head; pectorals short, 1⅚ to 2 in head, reaching beyond ventrals, but usually not to vent. Scales rough ctenoid; snout naked or nearly so; scales on maxillary and mandible minute and smooth, little evident, those on breast rough; fins invested in a thick membrane covered with fine scales. Color as in *Sebastodes zacentrus*, but usually with 2 elongate black streaks below lateral line; a black blotch on middle of ventrals; a bar at base of pectorals and in axil; peritoneum black; buccal and gill cavities white or slightly dusky. Coast of California, in deep water. A single specimen, 5 inches long, of this species was obtained at *Albatross* Station, 3189 in 218 fathoms, and it is evidently allied to the *rosaceus* group, but is without the pink spots. Below the lateral line is a single black streak, which grows more intense opposite the dark vertical bars. The interorbital space contains 2 low inconspicuous ridges, its width is contained 2⅓ times in diameter of eye. No spine or a very weak one at lower angle of subopercle. Five specimens, the longest 5½ inches from the Santa Barbara Islands. (Gilbert.) (*rupestris*, living about rocks.)

Sebastichthys rupestris, GILBERT, Proc. U. S. Nat. Mus. 1890, 76, Santa Barbara Islands, at Albatross Station 2946, Lat. 33° 58′ N., Long. 119° 30′ 45″ W., in 150 fathoms. (Type, No. 48241.)

Subgenus HISPANISCUS, Cramer.

2217. SEBASTODES SINENSIS (Gilbert).

Head 2½; depth 3. D. XIII, 12; A. III, 5; lateral line 40 to 45 (tubes); eye very large, 2¾ to 3 in head; snout 4⅔ to 5 in head. Body short and deep, heavy anteriorly, with slender caudal peduncle; mouth large, maxillary reaching beyond pupil, 2⅕ in head, its greatest width less than ⅓ its greatest length; jaws about equal, the lower mostly included within the upper, but the tip fitting into a notch between intermaxillaries, and with a somewhat projecting symphyseal knob; teeth present on vomer and in a long slender patch on palatines; interorbital space rather narrow, concave, with a pair of low ridges, its width 6 in head. Nasal spines present; preocular spines strong, triangular, directed outward; supraocular ridges low, but evident, diverging posteriorly, ending in strong spines; tympanic and occipital spines also strong; upper 3 preopercular spines equal in length, placed close, and usually nearly parallel, directed backward; lower 2 small, directed downward and backward; 2 opercular, 2 suprascapular, and 2 or 3 strong preorbital spines present. Gill rakers slender, the longest ⅕ orbit, 21 on anterior limb of outer arch. Spines rather high and strong, the dorsal moderately notched, the highest spine 2⅓ in head, about equal to soft rays, the lowest nearly ½ its height; membranes not deeply incised; second anal spine longer and stronger than third or than any of dorsal spines and longer than anal rays, its length about ½ head; caudal slightly lunate, ½ head; pectorals reaching slightly beyond vent, the lower rays not thickened, the fin 1⅗ in head; ventral spine as long as soft rays, 2¼ in head. Scales small, not regularly imbricated, smooth and cycloid, except those on occiput and a few along lateral line on posterior part of body; snout naked, maxillary and mandible only partly scaled; soft rays of all the fins covered with series of small scales. Pale below, dusky above, blotched with reddish and black; a blackish blotch on opercle; fins dull reddish, irregularly marked with blackish, the caudal mostly red, sometimes with a blackish terminal bar; cavity of mouth and gill chamber and peritoneum jet-black. Two specimens, the largest 7 inches long. Gulf of California, in deep water. (Gilbert.) (*sinensis*, living in the gulf.)

Sebastichthys sinensis, GILBERT. Proc. U. S. Nat. Mus. 1890, 81, Gulf of California, at Albatross Station 3015, Lat. 29° N., Long. 113° W., in 145 fathoms. (Type, No. 43085. Coll. Gilbert.)

2218. SEBASTODES ZACENTRUS (Gilbert).

Head 2⅘; depth 3⅓; caudal peduncle narrow, 3⅗ in depth of body. D. XIII, 14 or 15; A. III, 7 or 8; tubes of lateral line about 42, 70 vertical series above lateral line. Body elongate. Mouth moderate, maxillary reaching vertical from middle of pupil, 2⅓ in head; lower jaw slightly the longer, the tip with a small knob; teeth in very narrow bands. Eye much longer than snout, 3 to 3¼ in head. Interorbital space narrow, somewhat concave, 1⅔ in diameter of orbit; preorbital extremely narrow, its least width 2⁄7 pupil. Ridges on head low, but sharp, the spines rather strong; preocular ridge strong, triangular, ending in a strong outwardly directed spine; nasal, preocular, supraocular, tympanic, occipital, and sometimes nuchal spines present; 2 spines on shoulder, 2 on opercle, and the usual 5 on preopercle, the latter directed backward; preorbital lobate, but without spines. Gill rakers long, very slender, ½ diameter of orbit, 26 present on anterior limb of outer arch. Spinous dorsal low, with strong spines, the longest 2⅓ to 2½ in head; notch between dorsals rather shallow, the shortest spine more than ½ the longest; soft rays about equaling the spines; caudal truncate or slightly emarginate, 1⅔ in head; second anal spine very long, usually longer and stronger than third, curved, 1½ to 1⅘ in head, reaching to or beyond tips of soft rays in declined fin; ventrals reaching beyond vent, 1⅗ in head; pectorals reaching nearly to front of anal, 1⅓ in head, the fin not procurrent, the lower half with greatly thickened rays. Scales large, rough ctenoid, those on maxillary, mandible, and breast smoother. Five vaguely defined black bars on back, 1 downward from nape and front of dorsal, 2 approximated under spinous dorsal, 1 under middle of soft dorsal, and 1 on caudal peduncle; those under dorsal encroach more or less on the fin; all but the first continued below lateral line on middle of sides, the third interrupted above lateral line; 2 black streaks backward from eye, the upper terminating in a conspicuous black blotch on opercle, the lower ending on subopercle; caudal unmarked or with an obscure dusky median blotch; other fins unmarked; a faint dusky axillary blotch; sides marked with some red in life; roof of mouth posteriorly dusky, buccal and branchial cavities otherwise white; peritoneum jet-black. Coast of California. Types, 3 specimens, 5½ to 6½ inches long, from the Santa Barbara Islands, in 145 and 150 fathoms. (Gilbert.) (ζά, an intensive particle, and *κέντρον*, spine, strong-spined.)

Dr. Gilbert observes:

> Several specimens were taken north of Point Reyes on the coast of California, at depths of 75 and 51 fathoms (*Albatross* Stations, 3350 and 3351). The second anal spine is always very large, but frequently fails to reach tips of soft anal rays when depressed, thus differing from the type specimens. The depth is also greater, 3 instead of 3⅓ in length.

Sebastichthys zacentrus, GILBERT, Proc. U. S. Nat. Mus. 1890, 77, Santa Barbara Islands, at Albatross Stations, 2893 and 2996, in 145 and 150 fathoms. (Type, No. 48243. Coll. Gilbert.)

2219. SEBASTODES ELONGATUS (Ayres).

(REINA.)

Head 2⅗; depth 3⅓; pectoral 3⅓. D. XIII, 13; A. III, 6; scales 58. Body more elongate than in any of the other species (except *paucispinis*), compressed. Head long, rather pointed. Mouth large; maxillary extending to posterior margin of pupil, its length 2¼ in head; premaxillary on level of lower margin of orbit; lower jaw strongly projecting. Eye very large, longer than snout, 3⅓ in head; interorbital space broad, concave, with low frontal ridges. Preopercular spines very sharp, all pointed, directed backward; opercular spines very long and sharp. Gill rakers long and strong, the longest about ⅓ the eye. Scales large, not very rough; accessory scales numerous; maxillary, mandible, and preorbital scaly. Dorsal spines moderately high, rather strong, the highest about equal to soft rays, 2¾ in head, the fin not deeply emarginate; caudal fin lunate; anal fin rather low, second spine ½ length of head, much longer than third, higher than soft rays; pectorals moderately broad, long, reaching beyond tips of short ventrals to vent. Skull long, bones thin, preocular, postocular, tympanic, and parietal spines present, slender, sharp, the ridges moderately developed; sometimes supraocular spines present and distinct; parietal bones widely separated; interorbital space long and narrow, 5½ in base of skull, moderately concave; ventral process of basisphenoid well developed, mesethmoid processes compressed, slightly elevated; base of skull somewhat curved. Gill rakers 9 or 10 + 20 to 22, extending full length of arch. In the young the lateral stripes are broken up into smaller blotches, the interruptions to the dorsal stripe leaving a series of saddle-like blotches along the back, which correspond in position with those of *S. saxicola.* There is 1 under first dorsal spines, 1 under middle, and 1 under end of spinous dorsal, 1 under soft dorsal, and 1 on back of caudal peduncle. This correspondence is interesting in connection with similar color marks discovered in the young of *S. diploproa* and those known to occur in the young of the *rosaceus* group. Color light red; sides above with irregular horizontal interrupted olive-green bands, which are more or less broken into blotches, 2 of these bands below lateral line, becoming confluent behind; a distinct pale band following course of lateral line; upper fins blotched with olive, lower pale red; head olive and blotched above, pale red below; chin black; peritoneum dusky. Length 12 inches. Coast of California, from San Diego to San Francisco; not rare in rather deep water. This species bears considerable resemblance to *Sebastodes proriger*. (*elongatus*, elongated.)

Sebastes elongatus, AYRES, Proc. Cal. Ac. Sci., II, 1859, 26, fig. 9, San Francisco. (Coll. Dr. W. O. Ayres.)
Sebastodes elongatus, JORDAN & GILBERT, Synopsis, 669, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 600, pl. 64, fig. 22. and pl. 70, fig. 40.

2220. SEBASTODES LEVIS (Eigenmann & Eigenmann).

Head $2\frac{3}{4}$; depth 3; eye $1\frac{3}{5}$ in snout, $5\frac{1}{2}$ in head, 1 in interorbital, which is very slightly convex. D. XIII. $13\frac{1}{2}$; A. III, $7\frac{1}{2}$; lateral line 50. Head very large, pointed, its upper and lower outlines equally inclined. Mouth large, lower jaw projecting and entering profile; a well-developed symphyseal knob. Maxillary reaching to below posterior margin of pupil, greatly dilated behind, its width about equal to diameter of eye. Suborbital stay weak; opercular spines strong, pointed. Gill rakers all short, about twice as high as wide. Scales of head all cycloid, each scale with numerous small accessory scales. Mandible, maxillary, and tip of snout naked; preorbital with scattered patches of scales; scales of body weakly ctenoid. Highest dorsal spine little less than $\frac{1}{2}$ length of head, the membranes very deeply incised, those of first 3 spines meeting the succeeding ones on their basal fifth, the incisions becoming gradually shallower backward, the tenth membrane meeting the eleventh spine on its upper third; dorsal rays considerably lower than the highest spine; caudal emarginate; second anal spine greatly thickened, $4\frac{1}{2}$ in head; ventrals about 2 in head; pectorals $1\frac{4}{5}$. Skull long, bones thick, spongy; preocular, postocular, tympanic, parietal, and sometimes supraocular spines present, the ridges moderately developed; parietal bones meeting; interorbital space a little more than 4 in base of skull, concave, and on each side within the supraorbital ridges, higher in center, with a small median ridge and 2 others over mucous canals; ventral process of basisphenoid moderately developed; mesethmoid processes compressed, their upper surfaces depressed, base of skull straight. Pink, with 4 interrupted crossbars of black, the first below origin of dorsal, second below sixth dorsal spine, third below tenth spine, fourth below seventh dorsal ray; back sometimes dusky; 1 specimen having a large black blotch on anterior part of soft dorsal; peritoneum white. (Eigenmann & Eigenmann.) Length 2 to 3 feet; one of the largest specimens weighing 29 pounds. Coast of California, from San Diego to Monterey; not rare in deep water; occasionally seen in the markets of Los Angeles. (*levis*, capricious or fantastic, the root meaning light.)

Sebastichthys levis, EIGENMANN & EIGENMANN, Notes from the San Diego Biol. Laboratory, I, 6, 1889, San Diego (Type, No. 41904. Coll. Eigenmann); EIGENMANN & EIGENMANN, West American Scientist 1889, 129.
Sebastodes levis, CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 601, pl. 64. fig. 24.

2221. SEBASTODES RUBRIVINCTUS (Jordan & Gilbert).

(SPANISH FLAG.)

Head 2½; depth 2⅓; eye very large, 3¾ in head. D. XIII, 12; A. III, 7; scales 55. Body robust, rather deep and compressed. Head long, acute in profile, there being a nearly straight slope from a bony prominence in front of spinous dorsal to tip of lower jaw. Mouth rather large, oblique, the lower jaw projecting; maxillary broad, extending to opposite middle of eye, its length 2¼ in head; premaxillary on level of lower border of eye; interorbital space not so broad as eye, not widened behind, with sparse, smooth scales; mandible naked; maxillary with a few scales; suborbital stay very prominent, its tip nearly reaching preopercle; preopercular spines very strong, the second longest; opercular spines long; preorbital wide. Gill rakers rather short, robust, much compressed, the longest about ¼ of eye. Scales on head all small and thin, mostly cycloid; scales of body smoother than usual; accessory scales very numerous. Dorsal spines robust, rather high, the fifth not quite ½ the length of head, those behind rapidly shortened, the membrane joining the thirteenth spine below its middle; soft rays about as high as spines; caudal slightly emarginate; anal low, its second spine 2½ in head, much longer and stronger than third, both robust; pectorals moderate, not reaching vent, 3⅔ in length, the base equal to diameter of eye; ventrals not reaching tips of pectorals. Skull long, moderately thin; preocular, postocular, tympanic, and parietal spines present, long, strong, bluntish, the ridges moderately developed; parietals meeting; interorbital space long, narrow, 5⅓ in base of skull, nearly flat, a rather deep groove between the broad ridges over mucous canals; ventral process of basisphenoid well developed, mesethmoid processes compressed, not elevated; base of skull somewhat curved, about as in *Sebastodes elongatus*. Very pale rose-red, almost white, with cross bands of a deep, intense crimson red; these bands broadest on the back; 1 of the bands runs across eye, snout, suborbital, and maxillary, its boundaries indistinct; the next across nuchal region, front of dorsal and opercle; the next across middle of spinous dorsal, including ventrals and posterior half of pectorals; another across soft dorsal and anal; another across base of caudal, the fin itself being deep rose color; the other fins share the color of that part of the body against which they lie; peritoneum white. Length 15 inches. Coast of California, San Diego to Monterey, in deep water; rare. In life the most brilliantly colored large fish in our waters. (*ruber*, red; *vinctus*, banded.)

Sebastichthys rubrivinctus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 291, Santa Barbara Channel. (Type, No. 26989. Coll. Jordan & Gilbert.)

Sebastodes rubrivinctus, JORDAN & GILBERT, Synopsis, 669, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 601, pl. 64, fig. 23.

Subgenus AUCTOSPINA, Eigenmann & Beeson.

2222. SEBASTODES AURICULATUS (Girard).

(BROWN ROCKFISH.)

Head 3⅕; depth 2½. D. XIII, 13; A. III, 7; scales 45. Body oblong; rather deep. Mouth moderate, below axis of body, the jaws nearly equal;

maxillary reaching beyond eye, its length 2⅛ in head; preorbital broad; preopercular spines long, all directed backward, the second longest; opercular spines weak; 3 suprascapular spines. Scales on body large, ctenoid; accessory scales not very numerous; mandible naked. Spinous dorsal high, the longest spine 2 in head, higher than the soft rays, which are much elevated; second anal spine longer and stronger than third, 2⅓ in head; soft part of anal high; pectorals rather short and broad, the tips barely reaching the vent, their length 3½ in body; ventrals reaching to vent; caudal truncate. Bones of skull rather thin; preocular, postocular, tympanic, parietal, and coronal spines present, quite slender, sharp; parietal spines sometimes divided; the ridges moderately thick and high; parietal bones quite far apart, interorbital space narrow, 4 in base of skull, its middle convex, a depression on each side between the convexity and the supraocular ridge; ventral process of basisphenoid strongly developed; mesethmoid processes compressed, thin, elevated; base of skull straight. In one specimen the gill rakers are 7 + 15; on the upper limb 2 only are long and compressed, the others are round and thick, but slightly movable; on lower limb all those enumerated are compressed; in front is a mass that might represent rudiments of one or more. Color blackish brown, much mottled with light brown; top of head dark; a dark blotch on the upper angle of the opercle; entire body flushed with brownish red, this color most noticeable on front of head; a brownish red streak along middle of maxillary, and a second from the preorbital downward and backward across the cheek; another from eye to lower part of opercle; fins all marked with dark and light olive and reddish, the latter hue especially on the ventrals and anal; base of pectoral blackish; northern specimens are more blackish, and less uniform in color; old specimens are often nearly uniform reddish brown; the young sometimes with obscure dark bars, the caudal fin speckled. Length 18 inches. Pacific coast of America, from Cape Mendocino to Cerros Island, very abundant; the only species entering bays and caught with hook and line from wharves. It may be known at once by the coronal spines, these, however, often obsolete in the northern form, var. *dallii*. (*auriculatus*, eared.)

Sebastes auriculatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 131, 146, and U. S. Pac. R. R. Surv., X, Fishes, 80, 1858, Presidio, near San Francisco (Type, No. 347. Coll. Lieut. Trowbridge); AYRES, Proc. Cal. Ac. Sci. 1862, 215, fig. 68.

Sebastes ruber, AYRES, Proc. Cal. Ac. Sci., I, 1854, 7, San Francisco; adult.

Sebastes ruber, var. *parvus*, AYRES, Proc. Cal. Ac. Sci., I, 1854, 7, San Francisco; young.

Sebastodes auriculatus, JORDAN & GILBERT, Synopsis, 670, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, V, 1895, 601, pl. 65, fig. 26.

Represented northward (Vancouver Island to Point Reyes) by a form much darker in color, and lacking one or both coronal spines in about half the specimens:

2222a. SEBASTODES AURICULATUS DALLII (Eigenmann & Beeson).

This form is thus described: Head 3; depth 3. D. XIII, 14½; A. III, 6½. Dorsal spines moderate, 2 in head; lower jaw projecting. Maxillary extending beyond eye, about 2⅕ in head. Eye equals snout, $3\frac{6}{7}$ in head, considerably more than interorbital width. Interorbital concave, 2 strong ridges dividing it into a median and 2 lateral grooves; preorbital narrow, with 2 flat spine processes. Preopercular spines directed backward. Gill rakers about 2 in orbit; second anal spine 2⅓ in head; maxillary, mandibles and snout naked; scales mostly cycloid. Lower pectoral rays thick and fleshy. Three straight, dark cross bands, 1 from nape across base of pectoral, 1 from sixth to seventh dorsal spine toward anus, a half one from eighth to tenth dorsal spine to lateral line, a broader one below soft dorsal; these bars extend on to the dorsal fin; a few small dark spots on base of pectorals and on shoulder; sides of tail more or less mottled; dark streaks radiating from eye; peritoneum pale. Specimen, 8½ inches long; San Francisco. The type specimen belongs to the collection of the Indiana University. (Eigenmann & Beeson.) (Named for William Healy Dall, of the Smithsonian Institution, who has been intimately identified with the Pacific coast zoölogy for many years.

Pteropodus dallii, EIGENMANN & BEESON, Am. Nat., Vol. XXVIII, Jan., 1894, 66, San Francisco.
Sebastodes auriculatus dalli, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 798.

Subgenus PTEROPODUS, Eigenmann & Beeson.

2223. SEBASTODES RASTRELLIGER (Jordan & Gilbert).

(GRASS ROCKFISH.)

Head 3; depth 2¾. D. XIII, 13; A. III, 6; scales 47. Body oblong, deepest at the shoulders. Head short, blunt. Mouth moderate, little oblique, maxillary reaching to posterior margin of eye, its length 2⅕ in head; premaxillary rather below level of eye; jaws equal, without symphyseal knob. Eye small, anterior, 4½ in head. Preopercular spines short and stout, the 2 upper subequal; opercular spines very broad and flat, sometimes bifid; suprascapular spines strong. Gill rakers very short, wide, compressed, the longest almost as wide as high. Scales on body large; accessory scales few. Dorsal spines low, the fifth about ⅖ the length of head; the fin little emarginate; soft rays considerably higher than spines; caudal slightly rounded; anal high, its spines low, the second as high as third and much stouter, 3 in head; pectoral rather short, reaching vent, its base extremely broad, its width about ⅓ length of head; the lower rays much thickened; length of pectorals 3⅔ in body; ventrals moderate, not quite reaching the tips of pectorals. Bones of skull thick; preocular, postocular, tympanic, and parietal spines present, strong, the ridges low but thick; occipital ridges very long, equalling diameter of orbit; parietal bones separate; interorbital space 4¼ in base of skull, slightly convex, concave laterally inside of supraocular ridge narrower than eye; ventral process of basisphenoid well developed; mesethmoid processes compressed, strong, slightly elevated; base of skull very nearly straight. Blackish green, with paler mottlings, sides spotted with darker; belly pale greenish; paired fins dark, often bordered with reddish; other fins chiefly olivaceous, spotted with darker; the brightness of the olive and greenish shades is quite variable, but the species is always without definite markings and without bright red; peritoneum brownish. Length 15 inches. Coast of California, from San Diego to San Francisco; abundant southward. A strongly marked species, known at once by its short gill rakers. (*rastrellum*, diminutive of *rastrum*, a rake; *gero*, I bear; from the small gill rakers.)

Sebastichthys rastrelliger, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 296, Monterey. (Type, No. 27033. Coll. Jordan & Gilbert.)

Sebastodes rastrelliger, JORDAN & GILBERT, Synopsis, 671, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 602, pls. 65 and 70, figs. 27 and 41.

2224. SEBASTODES CAURINUS (Richardson).

Head $2\frac{3}{5}$; depth $2\frac{6}{7}$; eye and snout equal, 2 in maxillary, $4\frac{2}{7}$ in head. D. XIII, 12 to 14; A. III, 6 or 7; P. 17 to 19; scales 41 to 44 (pores); transverse rows of scales 42 to 47. Body stout, compressed, the back elevated. Head strongly compressed; the dorsal profile nearly straight; interorbital space nearly flat between the moderately elevated supraocular ridges, $5\frac{1}{5}$ to $5\frac{4}{5}$ in head; nasal, preocular, postocular, tympanic, and parietal spines present, sharp, the ridges moderate; maxillary $2\frac{1}{5}$ in head, its broad posterior end reaching about to posterior rim of orbit; lower jaw somewhat projecting with a symphyseal knob; fine scales on maxillary and part of lower jaw. Preorbital broad, with usually 1 or 2 small, rather blunt, spines; suborbital stay short; preopercular spines directed backward, the 2 upper sharpest, the middle one flatter and larger but not divided. Dorsal spines high, strong, the fourth longest, $1\frac{7}{9}$ in head; membrane of spinous dorsal deeply incised, attached to the thirteenth spine at about the middle of its height; the soft rays a little shorter than the spines; second anal spine scarcely longer or stronger than the third, $2\frac{1}{3}$ in head, $1\frac{2}{3}$ in soft rays; first anal equal to eye and snout; caudal truncate; pectoral reaching to or beyond vent, $3\frac{1}{6}$ to $3\frac{1}{3}$ in length of body, its base 3 in its length; accessory scales few. Dark brown, more or less washed with coppery or yellowish, the dark shades being dark red, the pale shades light brownish and better defined than in *S. vexillaris*, but similarly placed. In alcohol, body and head blackish above, with a very slight pinkish tint; paler below; fins all blackish; pale shades whitish; peritoneum white. Puget Sound to Sitka; abundant northward; replacing *S. vexillaris*. This species is very close to *Sebastodes vexillaris* in general character, but differs from it in color. It has fewer accessory scales, a more prominent, somewhat projecting, lower jaw with symphyseal knob, a broader preorbital, less flattened cranial ridges, a longer second anal spine, and lower dorsal spines. The body is apparently more compressed, the pectoral a little longer, the posterior end of the maxillary a little broader, with a slightly different outline. Here described from specimens from Seattle. (*caurinus*, northwestern, from *caurus*, northwest wind.)

Sebastes caurinus,* RICHARDSON, Voyage of the Sulphur, Ichthyology, 77, pl. 41, fig. 1, 1845, Sitka. †
Sebastodes caurinus JORDAN & GILBERT, Synopsis, 672, 1883.

2225. SEBASTODES VEXILLARIS (Jordan & Gilbert).

Eye moderate, high up, 4 to 4½ in head. D. XIII, 16; A. III, 6; scales 55. Body stout and compressed, back elevated. Mouth rather large, broad maxillary extending behind orbit, its length 2 in head; premaxillary on level of lower edge of pupil; jaws subequal, lower somewhat projecting, but without symphyseal knob; upper jaw emarginate at tip; interorbital space narrower than eye, occupied by 2 raised ridges, covered by the scales; preopercular spines moderate, some of them usually divided into 2, 3, or 4 at tip, middle one largest; preorbital very broad; suborbital stay short. Jaws naked. Gill rakers rather long and strong, the longest slightly clavate, about 2 in eye. Dorsal spines very strong and high, about as in *S. chlorostictus*, nearly as high as in *S. maliger*, the highest more than ½ length of head, and rather higher than the very high soft rays; membrane of spinous dorsal rather deeply incised, but less so than in *S. maliger*; second anal spine 3 in head, scarcely longer than third and not much stronger, about ⅔ as high as soft rays; caudal truncate; pectoral shorter than head, not reaching vent, its base rather broad, length 3¾ in body; ventrals not reaching vent. Bones of skull thick; preocular, postocular, tympanic, and parietal spines present (tympanic spines sometimes absent), the ridges rather low and heavy; parietal bones far apart; interorbital space 3¾ in base of skull, somewhat concave; a deeper median groove between 2 small ridges over the mucous canals; ventral process of basisphenoid well developed, mesethmoid processes compressed, a little elevated; base of skull straight. Bright pale yellowish red, becoming lighter below, the reddish and yellowish forming large and irregular areas, sometimes one shade predominating, sometimes the other; a pink cross blotch on back at base of second and third dorsal spines sometimes present; upper parts of head mostly pink, with broad olive shades running backward, 1 on lower lip, 1 on maxillary, 1 from preorbital region downward, 1 from eye backward and downward across cheek, and another across opercular spines; fins all pinkish red, membranes olive; vertical fins narrowly edged with dusky; top of head usually with alternating cross shades of pinkish and yellowish; yellowish shades sometimes replaced by light olive; other specimens are quite red; still others brownish; light areas on back have a position similar to that of the rosy spots in *Sebastodes constellatus;* peritoneum white. Length 2 feet. Coast of California, San Diego to Cape Mendocino, very common; one of the larger species. (*vexillaris,* standard bearing.)

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* The following is the original description of this species: "*Char. Spec.* S. genis inermibus, lineis elevatis intra orbitas nullis, spinis nasi utrinque binis, spinis ceteris capitis demissis; parte spinosâ pinnæ dorsi altâ arcuatâ; pinnis immaculatis." Radii: D. 13/13; A. 3/6; C. 13⅗; P. 9 et viii; V. 1/5. Plate XLI, fig. 1. Half nat. size. "This species greatly resembles the *S. norvegicus* in the armature of its head, but differs in the greater height of its dorsal spines and the larger size of the scales. It is better armed than the *S. variabilis*, which, like itself, is an inhabitant of the North Pacific Ocean, and it differs in the numbers of its fin rays both from that species and the *S. inermis* of Japan. It has more resemblance in its spines to *S. marmoratus* (Temm. & Schlegel, *Fauna Japon.*. tab. 21, fig. 1), but the markings on the fins differ and the dorsal rays of *caurinus* are higher than those of any of these 3 species. The length of the head and the height of the body are about equal, and are contained 3½ times in the whole length of the fish. The interorbital space is flattish, and is scarcely depressed below the margin of the orbit. Besides the usual spine above the nostrils there is a smaller one at the anterior opening. There is an acute point near the middle of the orbital crest, another at the posterior angle of the orbit, and a third smaller one on the temples close beneath it. The lateral cranial crest, commencing over the temporal spine, is low and even and ends in a similar point. The suprascapular shows an acute but not elevated edge, which ends in a sharp, angular point. Another point of the same bone is with difficulty detected among the scales lower down and the scapula has also a spinous point. The preorbital is divided into 3 shallow, truncated lobes, which are a little tiled No ridge can be traced externally across the cheek nor any spines under the eye. There are the usual 5 preopercular angles of spines and 2 opercular ones. Two minute teeth exist in the suboperculum and interoperculum at the point where these bones meet each other. All the spines are closely recumbent. There are 43 rows of scales in a longitudinal row, exclusive of some small ones on the base of the caudal. The specimen, being dried, has lost its colors. Length 15 inches." The northwest coast of America. The specimen was procured at the Russian settlement of Sitka. (Richardson, Voyage of the Sulphur, page 77.)

† This species is very abundant in Sitka Harbor, where many specimens were taken by us in 1896.

Sebastichthys vexillaris, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 292, Santa Barbara Channel; San Francisco. (Type, No. 27087. Coll. Jordan & Gilbert.)

Sebastodes vexillaris, JORDAN & GILBERT, Synopsis, 672, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 602, pl. 66, figs. 28 and 29.

2226. SEBASTODES MALIGER (Jordan & Gilbert).

(YELLOW-BACKED ROCKFISH.)

Head 2⅗; depth 2¼. D. XIII, 13; A. III, 6; scales 47. Body oblong, robust; head large; mouth moderate, the jaws nearly equal when closed; maxillary reaching to opposite posterior margin of eye, its length about ½ that of head; preorbital moderate, with an angular lobe; preopercular spines very short; opercular long. Gill rakers moderate, somewhat clavate, about as long as pupil. Scales rough; jaws naked. Dorsal spines very high and strong, higher than in any other species, the membranes very deeply incised, so that ½ or more of the length of the highest spines is free anteriorly; highest spine about ⅝ length of head, the fin deeply emarginate; soft dorsal high, but lower than the spines; caudal truncate; anal high, the second spine 2⅓ in head, little higher than the third, not ⅔ height of soft rays; pectorals very broad and rounded, reaching beyond ventrals to vent; base of fin broader than eye, the lower rays thickened, its length 3½ in body. Bones of skull moderately thin; preocular, postocular, tympanic, and parietal spines present, strong, sharp, the ridges high and thick; parietal bones well separated; interorbital space 4¼ in base of skull, deeply concave, with rather high ridges over mucous canals; ventral process of basisphenoid well developed, mesethmoid processes compressed, strong, much elevated; base of skull nearly straight. Color warm yellowish brown, the anterior portion of the back and sides usually clear yellow; breast yellow; anterior part of body and head, especially in the adult, closely covered with small round spots of a clear orange-brown color; posterior part of body darker than anterior, variously mottled; soft fins all slaty black, the pectorals and dorsal paler at base and speckled; brownish shades radiating from the eyes; peritoneum pale. Length 20 inches. Pacific coast of America, from Monterey to Sitka, mostly in deep water; very abundant northward; one of the largest species. (*malus*, mast; *gero*, I bear.)

Sebastichthys maliger, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 322, San Francisco. (Type, No. 27091. Coll. Jordan & Gilbert.)

Sebastodes maliger, JORDAN & GILBERT, Synopsis, 673, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 602, pl. 66, fig. 30.

2227. SEBASTODES GILBERTI, Cramer.

Head $2\frac{7}{12}$; depth $2\frac{3}{4}$ to 3. D. XIII, 13; A. III, 6; P. 17; transverse (oblique) rows of scales 40 to 42; lateral line (pores) about 39 to 42. Body somewhat compressed, its width over base of pectorals nearly 2 in the depth (over the shoulders). Head compressed; profile steep, nearly straight; preocular, postocular, tympanic, and parietal spines and ridges present, all rather delicate, the spines somewhat appressed, the parietal ridges diverging backward in slight outward curves. Interorbital space $1\frac{1}{2}$ in orbit, a little concave, with a pair of low ridges and a shallow median groove between them. Orbit high up, nearly circular, 4 in head, its posterior rim at about middle of length of head. Preorbital scarcely lobate on its margin, usually with 1 short triangular spine posteriorly; suborbital stay not visible externally; preopercular spines all directed backward, the 2 uppermost closer together than the others, the 2 lowermost weak; opercular spines rather small, sharp, without visible ridges; mouth nearly horizontal, the tip of the upper jaw nearly on a level with the lower rim of the orbit; maxilliary $2\frac{2}{7}$ in head, its posterior end reaching about to vertical from posterior rim of orbit; lower jaw very slightly projecting, with a slight symphyseal knob. Teeth on jaws, vomer, and palatines, the bands on the latter narrow. Gill rakers rather slender, 2 to 3 in orbit, 23 on anterior limb of first arch. Fourth dorsal spine highest, $1\frac{1}{13}$ in head; the membrane of the first dorsal very deeply incised, reaching only $\frac{1}{4}$ of the way up on the anterior side of the third, and about $\frac{1}{3}$ of the way up on the fourth spine, nearly to the tip of the twelfth, and about halfway up on the thirteenth spine; soft rays lower than the spines, about $1\frac{1}{3}$ in the longest spine; caudal fin truncate, with 11 or 12 full-length rays, about $1\frac{3}{5}$ in head; second anal spine longer and much stronger than the third, $2\frac{2}{5}$ in head, $1\frac{1}{5}$ in the soft rays; pectoral fin reaching to or a little beyond vent, $3\frac{1}{4}$ in length of body, the median rays longest, the 8 lower rays unbranched and thickened, base of fin 3 in its length; ventrals reaching not quite to vent, the spine about equal to third anal spine. Scales rather small, those of body, cheeks, and interorbital space all ctenoid, those of breast cycloid; maxillary with minute scales, lower jaw and top of head naked; accessory scales few, some of them ctenoid. Color in formalin: head blackish above; lips dusky; a dark band from front of orbit forward along side of snout; a dark stripe on maxillary; a blackish olivaceous band from preorbital backward and downward across preopercle; another broader band from posterior rim of orbit across preopercle and lower end of subopercle; a dark blotch on opercle; a blackish area in front of dorsal and in front of first and second spines, extending with interruptions to axils of pectorals, and on to the base of the fin, and downward and backward in a narrow broken band toward the vent; another band from below sixth and seventh dorsal spines downward and backward nearly to origin of anal; a third short one from below ninth and tenth spines to lateral line; a broad one under soft dorsal extending below lateral line and another across back of peduncle; all these dark areas extend up on the dorsal fin, their outlines are not sharply defined, and they, as well as the lighter areas of the body, are mottled with scattered and much darker spots; the lighter areas of the sides were in the fresh state a dull brick red, becoming lighter below; dorsal membrane blackish between first and third, and between fifth and eleventh spines; soft dorsal spotted, with blackish anteriorly; membrane of caudal dusky, the dark much broken into spots; anal and ventrals dusky; pectorals with a broad transverse, dark, spotted band near base, and a transverse dusky area with darker spots on distal half; fins in life probably more or less tinged with the reddish color; peritoneum white. Coast of California, rare: 3 specimens from San Francisco market, 7½, 8¼, and 8½ inches long; specimens also taken at Monterey. (Named for Dr. Charles Henry Gilbert.)

Sebastodes gilberti, Cramer, Proc. Cal. Ac. Sci. 1896. 241. with plate, San Francisco. (Coll. Dr. Jordan.)

2228. SEBASTODES CARNATUS (Jordan & Gilbert).

(Flesh-colored Rockfish.)

Head 2⅔; depth 2⅗. D. XIII. 13; A. III. 6; pyloric cæca 8; vertebræ 12+15; scales 43. Body rather short and deep; mouth low and rather short, maxillary extending to rather behind posterior edge of eye, its length 2 in head; premaxillary entirely below eye; jaws about equal: no symphyseal knob. Scales on head rather rougher than in *S. chrysomelas;* lower jaw, maxillary, space in front of eye, and nasal region naked. Cranial ridges well developed, but somewhat lower than in *S. chrysomelas*, covered with thick skin. Gill rakers short, clavate. Spinous dorsal always higher than in *S. chrysomelas*, the highest spines 2 in head, rather higher than the soft rays, the membranes more deeply incised than in *S. chrysomelas;* caudal truncate; anal moderately high, second spine 2¾ in head, stronger and slightly longer than third, about ⅔ height of soft rays; pectorals rather short, 3½ in head, about reaching to vent, their bases very broad, the lower rays thickened and fleshy; ventrals reaching vent. Bones of skull moderately thin; preocular, postocular, tympanic, and parietal spines present, sharp and strong, the ridges high and strong; parietal bones widely separated; interorbital space 5 in base of skull, concave; ventral process of basisphenoid well developed, mesethmoid processes compressed, thin, very much elevated, the points curved downward; base of skull straight. Yellowish brown, with blotches of clear flesh color or pinkish, the dark color predominating above, the pinkish below; membrane between third and fourth spines always pale, this color forming a blotch at the base of these spines, and then extending obliquely downward and backward, usually joining the ventral color; in front of this light area on the sides is a narrow oblique dark one, in front of which in turn is a pale one, which begins at angle of opercle and divides, passing around pectorals and uniting below them; a light blotch under eighth dorsal spine, extending up on the fin; another at junction of the 2 dorsals, and another under last ray; under each of these are irregular undulating pale areas; sides with pale blotches of all sizes; head above with cross shades and bands radiating from eye, its light shades tinged with purplish; fins colored like neighboring parts of body; peritoneum white. Length 14 inches. Coast of California, from San Diego to San Francisco; abundant in very shallow water, the young living close to the shore among rocks. (*carnatus*, flesh-colored.)

Sebastichthys carnatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 73, Monterey (Coll. Jordan & Gilbert); EIGENMANN & EIGENMANN, West American Scientist 1889, 130.
Sebastodes carnatus, JORDAN & GILBERT, Synopsis, 674, 1883.

2229. SEBASTODES CHRYSOMELAS (Jordan & Gilbert).

(BLACK AND YELLOW ROCKFISH.)

Head 2¾; depth 2¾. D. XII, I, 13; A. III, 6; scales 45. Body short and stout, compressed. Head short, bluntish. Mouth rather small, entirely below the axis of the body; lower jaw slightly included; premaxillaries on level of lower edge of orbit; maxillary reaching posterior margin of eye, its length 2 in head; preorbital wide. Cranial ridges covered with thick skin, ending in strong spines which diverge backward; preopercular spines short and thick; gill rakers as in *Sebastodes carnatus*. Scales moderate, rough, the accessory ones few; lower jaw, maxillary, nasal region, and space in front of eye naked. Dorsal spines high and strong, the highest 2¼ in head, rather higher than soft rays, the fin deeply emarginate; second anal spine 2¾ in head, much stronger than third, the two about equal in length; pectoral 3¾ in head, with very broad base, reaching beyond tips of ventrals, which reach nearly to vent; lower pectoral rays thickened; caudal truncate. Bones of skull rather thin; preocular, postocular, tympanic, and occipital spines present, the ridges very high and strong; parietal bones quite far apart, sometimes nearly meeting; interorbital space, in its narrowest part about 5¾ in base of skull, concave; ventral process of basisphenoid strongly developed; mesethmoid processes long, compressed, thin, elevated; base of skull straight. Pattern of coloration precisely as in *S. carnatus*, the colors different; the light shade a clear, warm, brownish yellow, with some specks of deeper orange, varying from a dusky orange to olivaceous yellow, the latter color more often seen on the belly; dark shade, black or dark brown, with slight olive tinge; dark color predominating on back; membrane between third and fourth dorsal spines and an area at base of these spines always pale; a yellow blotch extending thence downward and backward, usually joining the light color of belly; another light area passing from near angle of opercle around pectorals, uniting below them; 3 other blotches along back, 1 under eighth dorsal spine, 1 under last spine, and 1 under last soft ray; from each of these, irregular pale areas extend down the sides;

fins the color of the region to which they belong; head above with dusky cross shades and faint bands radiating from eye; peritoneum pale. Length 13 inches. Pacific coast of America, from Puget Sound to San Diego; abundant in rather deep water; northern specimens more dull in color than those from San Francisco. (*χρυσός*, gold; *μέλας*, black.)

Sebastichthys chrysomelas, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 455 and 465, Monterey. (Type, No. 26968. Coll. Jordan & Gilbert.)

Sebastichthys chrysomelas var. *purpureus*,* EIGENMANN & EIGENMANN, West American Scientist 1889, 130, San Diego.

Sebastodes chrysomelas, JORDAN & GILBERT, Synopsis, 675, 1883.

2230. SEBASTODES NEBULOSUS (Ayres).

(YELLOW-SPOTTED ROCKFISH.)

Head 3; depth 2¾; eye large, 3 in head. D. XIII, 13; A. III, 7; lateral line 49. Body robust, the back elevated, the profile steep. Mouth rather large, the jaws equal, the maxillary 2 in length of head, extending to beyond pupil; jaws naked; preopercular spines short. Gill rakers as in *S. chrysomelas*. Dorsal rather high, considerably emarginate, the highest spines 2 in head, higher than soft rays; caudal truncate; second anal spine 2½ in head, stouter and slightly longer than third, much lower than soft rays; pectorals short and broad, 3½ in length, reaching beyond tips of ventrals to vent. Scales rough, the accessory scales numerous. Bones of skull moderately thin; preocular, postocular, tympanic, and parietal spines present, the ridges very high and strong; parietal bones far apart; interorbital space narrow, 5 in base of skull, made deeply concave by the very high supraoccipital ridges, with nearly flat center; ventral process of basisphenoid well developed, mesethmoid processes compressed, thin, much elevated; base of skull straight. Ground color blue black of varying shade, sometimes tinged with yellowish anteriorly, everywhere finely and irregularly freckled and spotted with yellow or white, the light color usually bright and sharply defined; these spots smallest and most numerous on head; a broad irregular yellow band, made of confluent blotches, from between third and fourth dorsal spines, involving their membrane, downward to lateral line, thence backward to base of caudal; fins all black, with light spots at base; under parts soiled yellow; peritoneum pale. Length 12 inches. Pacific coast of America, from Vancouver Island to Point Concepcion; a very pretty species, in rather deep water; abundant. (*nebulosus*, clouded.)

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* Dr. Eigenmann thus describes *Sebastichthys chrysomelas purpureus:*

"The supraocular spines are raised much above the surrounding parts. Dorsal in one specimen XIII, 13½ in the other XIV, 12½. Membranes of all the fins dark greenish, tipped with purple. Base of anal yellow. Head and back dark brown; lower portions of sides purple; base of pectoral and its upper half brown, tinged with yellow. A purple bar extending from eye downward and backward to subopercle, below which is a greenish band. Gill membranes and membranes below maxillary, breast, and belly dirty yellow; mandibles purple, lower lip yellow, upper slate blue; membranes between third and fourth and seventh and eighth dorsal spines purple, the color extending on back; a similar spot on and below last dorsal spine; sides irregularly blotched with purple, this color not forming a band along posterior part of lateral line."

Two specimens from the San Diego market. (Eigenmann & Eigenmann.) Whether this is a distinct species or simply an intensification of the usual black and orange coloration we cannot determine.

Sebastes fasciatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 146, and in U. S. Pac. R. R. Surv., x, Fishes, 79, 1858, San Francisco; not of STORER.
Sebastes nebulosus, AYRES, Proc. Cal. Ac. Sci., I, 1854, 5, San Francisco.
Sebastichthys fasciolaris, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 297, San Francisco.
Sebastodes nebulosus, JORDAN & GILBERT, Synopsis, 676, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 603, pl. 67, fig. 32.

Subgenus SEBASTICHTHYS, Gill.

2231. SEBASTODES SERRICEPS (Jordan & Gilbert).

(TREEFISH.)

Head 3; depth 2½; pectoral 3½; eye small, 5 in head. D. XIII, 13; A. III, 5; scales 50. Body robust, compressed behind. Head compressed. Mouth large, the maxillary reaching to opposite middle of eye, its length 2½ in head; jaws equal. Cranial ridges covered with lax, thick skin, placed nearly in a right line on each side; interorbital space closely scaled; preorbital rather broad; preopercular spines sharp; jaws naked; membranes of spinous dorsal thick, covered with small scales. Gill rakers short, stiff, and clavate. Dorsal spines strong, rather low, scarcely exserted, lower than the soft rays, the longest 2⅗ in head; second anal spines 2½ in head, stronger than third, scarcely longer; pectorals broad and rounded, the lower rays thickened, the tips reaching vent; ventrals reaching beyond vent; caudal rounded. Bones of skull moderately thick; preocular, postocular, tympanic, parietal, and nuchal spines present, short, thick, rather blunt, the ridges very thick and high; nuchal spines sometimes coalescent with parietals; parietal bones meeting in a straight line; interorbital space narrow, 6 in base of skull, concave; 2 strong ridges over mucous canals; ventral process of basisphenoid well developed; mesethmoid processes strong, compressed, slightly elevated, distal half decurved; base of skull straight. Dark olive, blackish above, yellowish below; sides with about 7 oblique black cross bands, wider than eye, usually sharply defined, but sometimes faint in the young; 2 black bands downward and backward from eye; lips, mouth, front and lower part of head strongly washed with coppery red; bases of fins with small whitish spots; fins blackish olive; cranial ridges black; peritoneum pale. Length 12 inches. Coast of California, from Point Reyes to Cerros Island; very abundant southward, about rocks near shore; one of the most singularly marked of the rockfishes. (*serra*, saw; *-ceps*, head.)

Sebastichthys serriceps, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 38, Santa Catalina Island; Santa Barbara. (Type, No. 26918. Coll. Jordan & Gilbert.)
Sebastodes serriceps, JORDAN & GILBERT, Synopsis, 676, 1883; CRAMER, Proc. Cal. Ac. Sci., series 2, v, 1895, 601, pl. 65, fig. 25.

2232. SEBASTODES NIGROCINCTUS (Ayres).

(BLACK-BANDED ROCKFISH.)

Head 2⅘; depth 2⅗; eye large, 4½ in head. D. XIII, 15; A. III, 7; scales 50. Body short, deep, and compressed, deeper than in any of the other species; back arched. Head large, compressed. Mouth very large; maxillary extending to beyond pupil, 2 in head; lower jaw very slightly projecting, the symphysis not produced; premaxillary scarcely below eye. Cranial ridges higher than in any other species, their spines blunt, the ridges arranged in 2 nearly parallel series as in *S. serriceps,* the surface of the larger ones roughened by accessory spinous tubercles as in *S. rubberrimus;* occipital ridges very high; skin covering cranial ridges thin or obsolete, not lax; interorbital space sparsely scaled, very narrow, its breadth a little more than ½ diameter of eye, with very strong frontal ridges, which are not covered by the scales; jaws naked; preorbital broad, a low ridge extending along its surface and that of the suborbital; this ridge, somewhat rough and not covered with the scales, is continuous with the short suboribital stay; preopercular spines short, very blunt, the opercular spines very strong; scapular spines moderate. Gill rakers short and stout, clavate, the longest nearly ⅓ the diameter of the eye. Dorsal spines rather high and strong, the longest 2¼ in head, about as high as soft rays, the fin not deeply emarginate; caudal fin rounded; anal fin high, its second spine 2½ in head, higher and much stronger than the third; pectorals broad, fan-shaped, 3⅗ in length, their base ⅓ broader than the diameter of the orbit, their tips not quite reaching tips of ventrals. Scales rough. Base of skull nearly straight; interorbital space concave and narrow, about 6 in base of skull; process of mesethmoid directed nearly horizontally (in an old specimen); ventral process of basisphenoid well developed; cranial ridges very strong and high; interorbital space widening quite markedly backward, parietals meeting in middle lines. Bright orange red, with 5 jet-black vertical bars, overlaid with bright red; these bars comparatively narrow, none of them wider than eye; 1 at beginning of dorsal, extending downward on opercle and scapular region; a second, broader one, under middle of spinous dorsal; a third under posterior part of spinous dorsal; the fourth narrower, under front of soft dorsal; the fifth under middle of soft dorsal, all of these extending on the dorsal fin; 2 oblique black bands from eye, downward and backward across cheek; another upward and backward toward the nape; fins uniform deep orange, anal and ventrals tipped with blackish; mouth red; peritoneum white. Length 2 feet. Pacific coast of America, from Monterey to Vancouver Island, in deep water; very rare southward; occasionally about the Farallones, where the specimens here described were taken; rather common in the straits of Juan de Fuca; a large and singular species, the most striking in color of the group, and scarcely less beautiful than *Sebastodes rubririnctus.* It is evidently closely related to *Sebastodes serriceps.* (*niger,* black; *cinctus,* girdle.)

Sebastes nigrocinctus, AYRES, Proc. Cal. Ac. Sci., II, 1859, 25 and 217, fig. 6, San Francisco.
Sebastichthys nigrocinctus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 278.
Sebastodes nigrocinctus, JORDAN & GILBERT, Synopsis, 677, 1883.

NOTE.—For purposes of comparison we here append diagnoses of the remaining known species of *Sebastodes.*

I. SPECIES RELATED TO SEBASTODES MELANOPS AND S. OVALIS, FROM THE NORTHERN SHORES OF JAPAN.

a. SEBASTODES INERMIS (Cuvier & Valenciennes).

(ME WARU.)

Head very slightly more than depth; depth 2⅘ to 3. D. XIII, 15; A. III, 7; lateral line 38 to 42 (pores). Nasal, preocular, postocular, tympanic, and parietal spines present, all rudimentary. Upper profile of head rising rather rapidly, without curving, to the slightly curved nape. Head pointed forward. Lower jaw projecting, with symphyseal knob. Orbit rather more than 3 to 3⅗; snout (to tip of chin) 2⅔ to 2¾; interorbital space 4¼ to 4⅓ in head. Mouth oblique. Maxillary reaching middle of eye or a little beyond. Teeth in narrow bands on jaws, vomer, and palatines. Preorbital low, with 2 strong spines directed backward. Maxillary and mandible scaly. Upper outline of spinous dorsal quite strongly curved; fifth and sixth spines nearly ½ as long as head, first spine but little more than ½ orbit, the twelfth about equal to snout. Ventrals about 2⅗, pectoral about 1⅓, caudal about 1⅜ in head; ventrals reaching nearly as far back as longest pectoral rays, in some cases nearly to origin of anal; second anal spine stronger, sometimes a little shorter, sometimes a little longer than third; caudal nearly truncate. Maxillary extremely weakly scaled; mandible (*sic!*), snout, and preorbital scaleless. Lateral line parallel with dorsal outline, 38 to 42 pores on body, 2 on caudal. Blackish gray or reddish violet, paler below. Abundant at Tokio. (Steindachner & Döderlein.)

Sebastes inermis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 346, 1829, Japan (interorbital space not concave); GÜNTHER, Cat., II, 97, 1860; HILGENDORF, Sitz.-Bericht. Gesell. naturf. Freunde, Berlin, 172, 1880; STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wiss. Wien 1884, 205.

b. SEBASTODES VENTRICOSUS (Temminck & Schlegel).

Upper surface of head flat, the ridges and spines very feeble; interorbital width 5 in head; lower jaw acutely prominent; maxillary reaching middle of eye. Fourth dorsal spine longest, nearly ½ length of head, much longer than third anal spine. Brownish. Sea of Japan. (Günther.)

Hilgendorf regards *S. ventricosus* as identical with *S. inermis*, Cuvier & Valenciennes; but it appears to be distinct.

Sebastes ventricosus, TEMMINCK & SCHLEGEL, Fauna Japon., Poiss., 48, pl. XX, figs. 1, 2, 1842; BLEEKER, Verhand. Batav. Genootsch., XXVI, 80; GÜNTHER, Cat., II, 97, 1860.

c. SEBASTODES JOYNERI (Günther).

(TOKENOKO ME WARU.)

Head 3 to 3⅙; depth 3. D. XIII, 14 or 15; A. III, 7; P. 16 ($\frac{10}{8}$); lateral line about 42 to 49 (pores). Orbit 3; snout and interorbital width more than 3¾ in head. Mouth moderate, oblique; projecting lower jaw with symphyseal knob. Teeth delicate, sharp, in narrow bands. Maxillary not quite reaching middle of eye. Preorbital low (broad?) with 2 strong spines directed downward and backward. First (uppermost) spine of preopercle a little weaker than the fifth; second longest, the others decreasing rapidly in length. Opercular spines parallel, the upper stronger. Maxillary, under side of lower jaw, as in *S. inermis*. Preorbital and greater part of snout (nearly whole head except lips) scaled. Pores of lower jaw inconspicuous. Fourth to sixth dorsal spines longest, 2 in head; second anal spine stronger but equal to third in length, 2 in head. Pectoral somewhat pointed toward tip, as long as or only a little shorter than head, reaching beyond vent or even to origin of anal. Ventral and caudal 1½ in head, the latter slightly concave; basal half of spinous dorsal with minute scales; whole of soft dorsal, anal, and caudal completely scaled. Color in life (Döderlein), red, darker on the back; 5 blackish cross bands running upon dorsal fin and ending below (except second and third) at lateral line; last 2 bands short, rounded; the longest 2, middle bands sometimes interrupted, each sometimes forming 2 spots. Length $6\frac{1}{2}$ inches. Japan; Niphon, Tokio; apparently in deep water. (Steindachner & Döderlein.) Erroneously identified with *S. inermis*, Cuvier & Valenciennes, by Hilgendorf and Döderlein.

Sebastes joyneri, GÜNTHER, Ann. and Mag. Nat. Hist., I, 1878, 485, Niphon; Challenger Report, Shore Fishes, 64, pl. 29, fig. A, 1880.

Sebastes inermis, HILGENDORF, S. B. Gesell. naturf. Freunde, Berlin, 172, with plate, 1880; STEINDACHNER & DÖDERLEIN, Denksch. Akad. Wiss. Wien, 206, 1884.

d. **SEBASTODES ELEGANS** (Steindachner & Döderlein).

Head and depth $2\frac{3}{4}$. D. XIII, 12; A. III, 6; scales 35 (pores). Nasal, postocular, tympanic, and occipital spines present, but little developed. Orbit $3\frac{3}{4}$ in head, and attains $\frac{3}{4}$ of snout, $\frac{3}{5}$ of interorbital space. Maxillary reaching posterior rim of orbit. Teeth in rather narrow bands. Inferior border of preorbital slightly sinuate. Maxillary, mandible, and preorbital naked. Pores on lower jaw plain. Fourth to seventh dorsal spines longest; second anal spine a little stronger and lower than third; all the pectoral rays are simple (said by Steindachner to be only a peculiarity of young individuals); caudal truncate. The following measurements are taken with the head as standard: Width of head $2\frac{1}{2}$; fourth dorsal spine $4\frac{1}{3}$, penultimate $4\frac{1}{3}$, the last $3\frac{1}{3}$; dorsal rays $2\frac{1}{2}$; pectoral $1\frac{1}{2}$; ventrals $1\frac{3}{4}$; base of pectoral $3\frac{3}{5}$; ventrals reaching to vent, the pectorals beyond. Color light; body with 5 dark brown, more or less interrupted cross bands; similar spots covering fins and under side of head and body; head dark above and with several dark-brown bands radiating from eye. A single individual. Tagawa. Length $2\frac{3}{5}$ inches. (Steindachner & Döderlein.)

Sebastes elegans, STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wiss. Wien, 205, 1884, Tagawa.

e. **SEBASTODES STEINDACHNERI** (Hilgendorf).

(AKA SOI; YANAGI NO MAI.)

Head $3\frac{1}{4}$. D. XIII, 15; A. III, 7; P. 18 ($\frac{9}{9}$); lateral line 30 (pores). Spines not prominent. Nasal quite strong; preocular, supraocular, and tympanic rudimentary. Preorbital with 2 blunt spines or lobes. Scales moderate; mandible and preorbital naked; pectoral scaly, rough. Orbit (longitudinal diameter) $3\frac{1}{8}$ in head ($\frac{3}{4}$ in snout). Interorbital space $1\frac{1}{4}$ in orbit (vertical diameter), 4 in head (probably convex). Maxillary reaching beyond middle of eye. First dorsal spine $2\frac{1}{8}$, penultimate $2\frac{2}{3}$ to $3\frac{1}{3}$, last $2\frac{3}{4}$ to 3 in head. Second anal spine longest, $2\frac{1}{6}$ in head; third $2\frac{1}{4}$ to $2\frac{1}{2}$ in head. Red; a dark spot on upper part of opercle. Distinguished by the long penultimate dorsal spine. Length 11 inches. Yezo. (Hilgendorf. Description from dry specimens.)

Sebastes steindachneri, HILGENDORF, S. B. Gesell. naturf. Freunde, Berlin, 172, with plate, 1880, Yezo.

f. **SEBASTODES OBLONGUS** (Günther).

Head $3\frac{3}{5}$; depth $3\frac{1}{2}$. D. XIII, 12; A. III, 5; lateral line about 65. Scales rather irregular, much smaller above than below lateral line. Head scaly above as far forward as nostrils; very minute scales on preorbital. Snout pointed, longer than eye. Interorbital space flat, equal to eye, 6 in head. None of spines on upper side of head projecting, those on preopercle obtuse. Teeth in broad bands on jaws, vomer, and palatines. Maxillary reaching posterior margin of eye. Dorsal spines strong, fourth to seventh longest, $2\frac{1}{2}$ in head; anal spines stronger, much shorter than longest dorsal. Brownish, marbled with darker; lower parts and all fins with brown spots; an oblique brown streak from preorbital toward angle of preopercle. Inland sea, Japan; market of Yokohama. (Günther.)

Sebastes oblongus, GÜNTHER, Challenger Report Shore Fishes, 64, pl. 28, 1880, Inland sea, Japan, Yokohama; HILGENDORF, S. B. Gesell. naturf. Freunde, Berlin, 171, with plate, 1880.

g. **SEBASTODES MITZUKURII,** Cramer new species.

Head 2¾; depth 3½. D. XIII, 12; A. III, 7; lateral line 42 (pores). Nasal, postocular, tympanic, and parietal spine present, all rudimentary. Orbit equaling interorbital space, 5½ in head, 1⅛ in snout. Maxillary reaching beyond posterior rim of orbit. Teeth on jaws in broad bands. Inferior border of preorbital very slightly lobed. Lower preopercular spines nearly obsolete. Head scaly; maxillary and mandible naked. Pores on lower jaw but little developed. Fourth to seventh dorsal spines longest; second anal spine longer and stronger than third· pectoral rounded; caudal slightly concave. The following measurements are taken with the head as standard: Width of head 2⅓; fourth dorsal spine 2¼; penultimate 5; last dorsal spine 4¼; second anal spine 3, third 3¾; dorsal rays 2½; pectoral 1½; ventrals 1⅘; base of pectoral 4⅓; ventrals reaching to vent, pectorals beyond. Body dark brown; 5 dark bands radiating backward from eye; lower part of head pale with brown spots. Single individual. Tokio. Length 12½ inches. (Steindachner & Döderlein.) Steindachner has called this a doubtful variety of *S oblongus*, Günther; but it seems to be distinct. The difficulty of comparison is increased by discrepancies between Günther's description and figure.

Sebastes oblongus (Var?), STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wiss. Wien, 204, 1884, Tokio.

h. **SEBASTODES TACZANOWSKII** (Steindachner).

Head 3; depth a little more than 3. D. XIII or XIV, 13 or 14; A. III, 7; P. 16; lateral line 46 (pores). Head as in *S. inermis*, Cuvier & Valenciennes. Supraocular region and occiput without externally visible spines or ridges. Nasal and preocular spines present, weak. Spinous dorsal low, with evenly curved margin; sixth dorsal spine highest, equal to distance from posterior margin of orbit to tip of upper opercular spine. Basal third of spinous dorsal and more than basal half of soft dorsal and anal scaled. Pectoral 3⅖ in body. Orbit 3½; interorbital space 5; snout (to tip of slightly projecting chin) 3½; greatest width of head 2¼ in head. Teeth on jaws, vomer, and palatines, small, sharp. Truncate end of maxillary reaching nearly to posterior rim of orbit. Preopercle with 5 spines, second and third longest, nearly equal, the points directed upward and backward, the lowest very short; angle of preopercle rounded; opercle with 2 sharp spines, the upper longer. Anterior dorsal rays highest, little longer than longest spine; caudal nearly truncate, almost entirely scaled; second anal spine longer and stronger than third, slightly curved, a little shorter than caudal; first ventral ray longest, ⅗ of head, the spine as long as highest dorsal spine. Brownish violet, gradually paler toward belly; without or with indistinct patches of darker shades on body and longitudinal bands behind eye; fins blackish; caudal white edged. Length 6 inches. Northern Japan. (Steindachner.)

Dr. Jordan and Dr. Gilbert have the following notes on a specimen 16 cm. long, from Shana Bay, Iturup Island (one of the Kurils). The specimen agrees well with Steindachner's description of the types, which came from northern Japan:

Color warm brown above and on sides, paler brown below; obscure shadings of darker brown on upper part of sides; many scales with basal or central area darker; opercles with a dusky shade; no dark streaks on head; fins brown, all except the pectorals and caudal becoming distinctly black on distal portion; lining of buccal and gill cavities white, but with a narrow dark streak along each side of floor of mouth anteriorly; peritoneum brownish black, uniformly and densely pigmented. Crown and occiput evenly convex, without spines or ridges. Nasal spines low and strong. A rather wide, low preocular ridge, ending in a strong depressed spine; supraocular ridge nearly obsolete, without spine, its posterior portion evenly scaled over. Preorbital sinuate anteriorly, without spines; preopercular spines short and strong flattened, the second and third the largest, directed backward, the fifth represented by a slightly projecting lobe; opercular spines similar to those on preopercle, the lower the largest. Gill rakers long and slender, 10 + 27, the longest half the orbital diameter. Head 3⅐ in length; depth $2\frac{9}{10}$. Least depth caudal peduncle 3⅕ in head. Eye 3½ in head; interorbital space 4½; snout 4; maxillary 2. D. XII, I, 14; A. III, 7. Pectorals with 16 rays, of which the lower 7 are simple. Forty-five pores in the lateral line. Spinous dorsal low, with evenly rounded contour, the fourth, fifth, and sixth spines equal, twice the twelfth, 2⅓ in head. Longest soft ray of dorsal 2¼ in head. Second anal spine longer and much stronger than third, 2 in head. Caudal slightly emarginate. Pectorals reaching beyond vent, 3⅗ in length. Ventrals slightly overlapping the vent, equaling distance from tip of snout to upper end of preopercle. Scales strongly ctenoid, except on cheeks, breast, and fins. Top of head scaled forward to nasal spines. Cheeks, opercles, and preorbitals wholly invested, except the anterior extremity of the latter. Maxillary and mandible with partially embedded cycloid scales. Branchiostegal rays naked, or partially invested. Scales on breast and prepectoral area excessively small. Many small accessory scales on back and sides. Basal ½ to ¾ of vertical fins densely scaled Series of fine scales follow pectoral and ventral rays nearly to their tips.

Sebastes taczanowskii, STEINDACHNER, Sitzb. Akad. Wiss. Wien, 256, pl. 2, fig. 1 (dorsal XIV, 13), 1880, Bays of the Gulf of Stuietok, Sea of Japan

II. SPECIES ALLIED TO SEBASTODES ROSACEUS, FROM SOUTH AMERICA AND THE CAPE SEAS.

i. **SEBASTODES OCULATUS** (Cuvier & Valenciennes).

(CABRILLA.)

Body thickset, its depth 4 in total length. D. XIII, 14; A. III, 8; P. 18. Nasal, preocular, supraocular, postocular, tympanic and parietal spines present, quite strong. Opercle, suprascapular and scapula with smaller spines. Notchings of the preopercle distinct and as strong as the spines. Dorsal spines slender, anal spines longer and stronger. Caudal truncate. Color (in., Gray's figure) reddish brown on back, silvery rose below; 4 brilliant rosy spots on the brown of back at base of dorsal, the first under fourth spine, second under ninth spine, the third under origin, and the fourth under end of soft dorsal; there is a fifth spot on the side at the height of the shoulder and between the first 2 spots; fins brown (more or less deep) and bordered with bright rose. Description based on an individual 4½ inches, the figure on one 8 inches long. On rocky bottoms in deep water, Valparaiso, Coast of Chile. (Cuvier & Valenciennes.)

Sebastes oculata, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IX, 466, 1833, Valparaiso; GÜNTHER, Cat. Fishes, 105, 1860 (in part).

j. **SEBASTODES DARWINI** (Cramer).

Closely allied to *Sebastodes rosaceus*. Spines similar in number and position, but a trifle higher; upper spines on preopercle longest. Gill rakers slender, $x + 18$, nearly as long as pupil. Jaws subequal. Pectoral short, 1⅓ in head, the lower rays thickened. Second anal spine long, curved. Anal III, 6. Compared with a specimen of *S. rosaceus* of the same size, the snout is blunter in *S. darwini*, the cranial ridges are a shade higher; the pectoral is shorter, reaching only to vent, while in *S. rosaceus* it reaches to second anal spine; the second anal spine is much longer than third (subequal in *S. rosaceus*); the dorsal spines are lower, 3 in head (2⅔ in *S. rosaceus*). Scales similar. Mexillones, Peru Here described from the MS. notes of Dr. Jordan on the type in Mus. of Comp. Zool., Cambridge, Mass.

Jenyns described a specimen from Valparaiso as *S. oculatus* of Cuvier & Valenciennes, but pointed out distinctions between the two, which with later knowledge of related species, prove beyond a doubt that it is distinct; it is probably identical with *S. darwini* from Peru. He also mentioned the figure of another species from Valparaiso, very distinct from the others in having the spines of the head less developed. About 50 species of the genus have been described from the north temperate waters of the Pacific coast of America, and it is not improbable that the species of this genus will be found numerous in the temperate waters of the South American coast.

? *Sebastes oculata*, JENYNS, Voyage H. M. S. *Beagle*, Zool., Fish., No. II, part 4, 37, 1840, Valparaiso. (Coll. Darwin.)

Sebastes darwini, CRAMER, Proc. Cal. Ac. Sci. 1896, Mexillones, Peru.

k. SEBASTODES CAPENSIS (Gmelin).

Head 3; depth 3½ in total length. D. XIII, 13; A. III, 6; lateral line 70; pyloric cæca 11. Upper surface of head rather flat, with low ridges and some depressed spines behind orbit. Interorbital width 6 in head. Maxillary reaching beyond middle of eye. Third to seventh dorsal spines nearly equal, 3 in head; second anal spine longest. Reddish; Cape Seas. (Günther.)

Steindachner has compared *S. oculatus*, Cuvier & Valenciennes, with specimens of *S. capensis* from the Cape of Good Hope, and found no difference whatever between them, and considers them identical. The early history of the group is full of identifications of different species whose distinctness is now established beyond a doubt, and it is desirable that extensive comparisons be made between these two species before they are merged. There are some striking discrepancies in the various descriptions and figures of *S. capensis*, and it would not be surprising if a close study should reveal several well-marked species at the Cape itself.

Perca dorso monopterygio, GRONOW, Zoophylaceum, No. 293, 88, 1763.
Scorpæna capensis, GMELIN, Syst. Nat., III, 1219, 1788, Cape of Good Hope.
Scorpæna africana, LACÉPÈDE, Hist. Nat. Poiss., III, 266. 1802, Cape of Good Hope.
Sebastes capensis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 341, 1829; QUOY & GAIMARD, Astrol., Vol. III, Poiss., 690, pl. 11, fig. 3, 1834; SMITH, Illustr. S. Afr. Pisces, pl. 22, fig. 1, 1845; GÜNTHER, Cat., Fish., II, 96, 1860.
Perca afra, GRONOW, Cat. Fish., Ed. Gray, 113, 1854, Cape of Good Hope.

III. ALLIED TO SEBASTODES ALEUTIANUS, IS THE JAPANESE SPECIES.

l. SEBASTODES MATSUBARÆ (Hilgendorf).

(AKA UWO.)

Head 2⅞. D. XIII, 12; A. III, 6; P. 20 ($\frac{10}{10}$); lateral line about 36. Preocular, supraocular, postocular, tympanic, coronal, parietal, and nuchal spines present; preoculars large, the parietal and nuchal spines close together at the end of a sharp-edged parietal ridge. A pair of weak ridges on interorbital space, between them a median groove. Preorbital with 3 spines, the first blunt, rounded, the second and third successively more pointed, the last directed nearly downward. Scales moderate; head nearly completely scaled; pectoral fin scaly. Horizontal diameter of eye 2⅔ in head, ⅔ in length of snout. Interorbital space 1½ in vertical diameter of eye, 4 in head. Maxillary reaching beyond middle of eye. Longest spine of first dorsal 2⅓ in head, the last but one, 4, and the last spine, 3¼ in the head; second and third anal spines equal in length, 2¼ in head. Eye large. Color red. (Hilgendorf.) The type on which this description is based came from the Island of Honto. Another larger specimen from farther south (Yezo) differed from the above in the following characters: Anterior spine of the preorbital not developed, and the third spine double. D. XIII, 14; A. III, 8; P. 18 ($\frac{10}{8}$). Lateral line 32 to 36. Scales larger, those on pectoral fins prickly. Head 3; horizontal diameter of eye 3⅓ in head, ¾ in length of snout. Interorbital space 1¼ in vertical diameter of eye. Maxillary eaching middle of eye. Last dorsal spine but one, 5⅓, and the last one, 3⅔ in head; secondr and third anal spines 3 in head. The local name of this form is aka uwo. Honto, Yezo, Japan. The specimens from the Aleutian Islands, in Pallas's collection (No. 8145, Mus. Berlin) referred by Dr. Hilgendorf to *S. matsubaræ*, is our *Sebastodes aleutianus*, an allied species with smaller scales and lower spines. (Named for Matsubara, a Japanese naturalist.)

Sebastes matsubaræ, HILGENDORF, Sitzb. Gesell. naturf. Freunde 1880, 170, Honto, No. 11280, Mus. Ber.; Yezo, No. 11279, Mus. Ber.

IV. SPECIES ALLIED TO SEBASTODES NEBULOSUS, FROM JAPAN.

m. SEBASTODES NIVOSUS (Hilgendorf).

(KOGUMESO OR KESHIMUYO; GOMA SOI.)

Head and depth 2⅔ (about 3½ in total length). D. XIII, 12; A. III, 6; P. $\frac{8}{11}$; lateral line 70, pores 36 to 39. Nasal, preocular, postocular, tympanic, and parietal spines present.

Upper profile slightly convex to beginning of dorsal, slightly depressed behind eye. Eye and snout 4⅗, interorbital space 5½ in head. Maxillary reaching to posterior rim of orbit, in older individuals somewhat farther. Inferior border of preorbital with 3 more or less rounded lobes, the last with a short blunt spine. Interorbital space between the elevated supraocular ridges weakly convex. Head entirely scaled, except jaws, snout (in front of nostrils), preorbital, and nearly the whole of interopercle; scales of head small, firm, rough, with accessory scales like those on body. Preopercular spines 5, short, broad, blunt. Spinous dorsal uniformly rounded; fifth and sixth spines longest, in young, 2, in adults nearly, 2¼ in head. Second anal spine much stronger, but little longer than third, 2½ to 2⅗ in head. Pectoral about ⅔ in head; ventral more than 1⅗ in head; caudal equalling ventral, slightly convex; 36 to 39 pores on body, 2 to 3 on base of tail. Blackish brown, with innumerable small white dots on body and fins. In some individuals the uniform dark brown of body is interrupted by lighter shades. (Steindachner & Döderlein.) Length 10½ inches. Not rare at Tokio; 1 specimen at Hakodate.

Sebastes nivosus, STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wiss. Wien, 202, pl. 7, 1884, Tokio; Hakodate.

n. SEBASTODES SCHLEGELII (Hilgendorf).

(KURO SOI.)

Head 2¾ to 2⅚; depth less than 3 (3½ in total length). D. XIII, 12; A. III, 7 or 8; lateral line about 66 to 70. Nasal, preocular, postocular, tympanic, and parietal spines present; interorbital space probably concave, with interorbital ridges. Orbit 4¼; snout (to tip of slightly projecting chin) a little less than 4; interorbital space 4⅗ to 5 in head. Maxillary reaching posterior margin of orbit. Preorbital with 2 to 3 sharp spines directed downward and backward. Preopercle with 5 flat spines, the second from above longest, horizontal, the fifth (in adults) often blunt and broad. Interopercle with a weak, sharp spine, beside it sometimes another on lower end of subopercle. Head scaled; jaws, snout, and anterior part of preorbital scaleless. Scales on interopercle extremely small. Several large pores on under side of lower jaw. Sixth and seventh dorsal spines longest, a little more than 2 in head. Second anal stronger, sometimes a little shorter, sometimes a little longer than third, 2⅗ to 3 in head. Pectoral a little longer than ventrals, about 1½ in head. Caudal nearly truncate. Tip of ventrals reaching, pectorals not quite reaching vent. Brownish gray (in alcohol), with lighter and darker shades; a dark stripe on maxillary, and 2 or 3 on cheek; opercle above and below with washed out spot. (Steindachner & Döderlein.) Length 12 to 15 inches. Quite common at Tokio; Gulf of Strietok, Sea of Japan; Yezo, Yedo, and Hakodate.

Sebastes schlegelii, HILGENDORF, S. B. Gesell. naturf. Freunde, 1880, 171, with plate, Japan; STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wiss. Wien, 1884, 202.

o. SEBASTODES TRIVITTATUS (Hilgendorf).

(SHIMA SOI.)

Head 2⅗ to 3. D. XIII, 13; A. III, 6; pectoral 18 (9 or 10 lower rays simple); lateral line 36 (tubes). Cranial spines prominent; nasal, preocular, postocular, tympanic, and parietals present. Interorbital space 1 to 1⅛ in vertical diameter of orbit, 4¾ to 5 in head, concave, with a pair of interorbital ridges at the sides of a median groove. Preorbital without prominent spines, with 2 blunt or rounded lobes. Scales median; maxillary, mandible, preorbital, and ¾ of interopercle naked. Pectoral fin scaly, the scales rough. Gill rakers long. Orbit 3¾ in head, maxillary reaching middle of eye. First dorsal spine 1⅞ to 2⅛ in head, penultimate 4 to 4½, last 3⅛. Second anal spine longest, 2⅛ to 2¾ in head; third 2¼ to 3 in head. Caudal slightly convex. Light brown; 3 dark longitudinal bands. (Hilgendorf.) Length 23 inches. Yezo.

Sebastes trivittatus, HILGENDORF, S. B. Gesell. naturf. Freunde, Berlin, 171, with plate, 172, 1880, Yezo, Japan.

p. **SEBASTODES VULPES** (Steindachner & Döderlein).

Head 2⅗ to 2½; depth 3⅛ to 3. D. XIII, 13; A. III, 6; P. $\frac{9}{9}$; lateral line 61 (32 to 36 pores.) Nasal, preocular, postocular, tympanic, and parietal spines present, quite strong; eye 4 to 4⅔, snout (to tip of symphyseal knob of lower jaw) 4 to 4¾, interorbital space 5⅜ to 5 in head. Maxillary reaching posterior margin of orbit; lower jaw projecting, with symphyseal knob. Lower border of broad preorbital with 3 blunt lobes; preopercle with 5 spines, the 2 lower broad, blunt, the 3 upper more slender, sharp, the 2 opercular spines strongly diverging; upper end of interopercle, especially in older individuals, with a spine; lower end of subopercle with a weaker spine which sometimes divides into several. Snout, anterior part of preorbital and lower jaw scaleless; a few very small scales on maxillary behind and under preorbital; rest of head thickly covered with rough scales. Several pores on each side under lower jaw. Interorbital space nearly flat, with very weak interorbital ridges. Gill rakers long and slender. Upper profile rises moderately, slightly curved at the snout. Fifth or sixth and seventh dorsal spines longest, 2 to 2¼ in head. Second anal spine stronger, but sometimes a little shorter than third, 2½ in head in small individuals, nearly 3 in larger ones. Pectoral equals head without snout, reaching vent in adults, a little beyond in young; ventral 1⅔ to 1¾ in head; caudal equaling ventrals, slightly convex. Scales moderately large, with some accessory scales. Body, dorsal, anal, and caudal fins mingled reddish brown and whitish; pectoral and ventral grayish; upper half of head reddish brown, strewn with small dark-brown spots which posteriorly almost unite in wavy stripes, or marked like body; lower side of head and body whitish yellow. Not rare in fish markets of Tokio. Very close to *S. schlegelii*, Hilgendorf, but easily distinguished by the absence of spine on inferior border of preorbital. (Steindachner & Döderlein.)

Sebastes vulpes, STEINDACHNER & DÖDERLEIN, Denkschr. Akad. Wissensch. Wien, 203, pl. 2, 1884, Tokio.

691. SEBASTOPSIS, Gill.

Sebastopsis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 278 *(polylepis)*.

This genus differs from *Sebastodes* in the absence of palatine teeth. D. XIII, 9 or 10; A. III, 5. No dermal flaps; cheeks and opercles scaly; preorbital with obtuse spines or none. The known species are all of very small size and are often preserved in Chinese insect boxes. (*Sebastes; ὄψις*, appearance.)

2233. **SEBASTOPSIS XYRIS**, Jordan & Gilbert.

Head 2⅓; depth 3½. D. XIII, 10; A. III, 5; scales 48; maxillary 1⅘ in head; eye 3½; pectoral about 1; longest dorsal spine 2⅔; second anal spine 1⅔; ventral 1½; middle caudal ray about 2 in head. Body moderately elongate; head rather sharp; jaws equal; interorbital space concave; top of head scaly and without occipital depression; usual spines sharp, with a fleshy flap nearly as long as pupil; spines above eye each with a similar fleshy flap; preorbital, supraorbital, postorbital, and tympanic spines present, each sharp and high; occipital and nuchal spines also well developed; a small temporal spine; a small spine under the eye on the sharp stay; a spine at end of stay in front of the perpendicular spines; the last with a small spine at its base; 2 sharp spines below opercular spine. Cheeks and opercles covered with ctenoid and imbricated scales without flaps; body scales ctenoid and closely imbricated, without flaps. Gill rakers very short and slender. Breast covered with imbricated cycloid scales. Viliform teeth on jaws and vomer, none on palatines.

Dorsal thin and moderately deeply notched; caudal rounded; third anal spine greater than second; pectoral with upper rays branched; lower or simple rays thickened and the upper of them longer than any of the branched rays. Color light olive, irregularly banded and blotched with darker; flushed with cherry red; subopercle with large black blotch somewhat ocellated; head blotched with olive and paler; jaws and throat largely orange; dorsal mottled with blood-red, orange and whitish; pale yellowish bar across soft dorsal, then a blackish streak; rest of fins white, tipped with black; caudal largely bright scarlet, black toward tip; anal largely scarlet, mottled with black; pectoral yellowish, barred with white and black, lower part of fin washed with scarlet; ventral light yellow, with a few black spots on posterior half, and scarlet spots on anterior portion. The most definite marks are a dark bar from soft dorsal to base of anal, everywhere washed with scarlet, and the black spot on the subopercle. Pacific coast of Mexico and neighboring islands; the original types from Cape San Lucas, a few other specimens taken by the *Albatross* off Lower California, the above notes on the color from specimens collected by Mr. McGregor at Socorro Island, respectively 3½, 2¼, and 2 inches long. (*ξυρόν*, razor, from the sharp spines.)

Sebastopsis xyris, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 369, Cape San Lucas. (Type, No. 30979. Coll. John Xantus.)

692. HELICOLENUS, Goode & Bean.

Helicolenus, GOODE & BEAN, Oceanic Ichth., 248, 1896 (*dactylopterus*).

Body oblong, somewhat compressed; head large, ctenoid scales on its tip, and on cheeks and opercles; several series of spinous ridges on head, but no occipital pit; mouth large, with bands of villiform teeth on jaws, vomer, and palatines. Dorsal fin continuous, not deeply notched, with 10 stout spines and 10 to 12 rays; anal with 3 spines and 6 rays; pectoral broad, fan-shaped, with rays arranged in 3 groups, the first of 2 simple rays, the second of 8 or 9 branched rays, the third of 8 simple rays, sometimes prolonged, with their tips tendril-like and free from membrane for ½ their length or less; soft dorsal with tips free from membrane; suborbital keel smooth, or with a single anterior spine under eye; preorbital with spines small and hidden beneath the skin. Vertebræ 10+14=24; no air bladder. Atlantic. Very close to *Scorpæna*, differing only in the *Sebastes*-like cranium, the two genera probably connected by intermediate forms. (*ἡλίκος*, strong; *ὠλένή*, elbow, arm.)

a. General color bright red. DACTYLOPTERUS, 2234.
aa. General color clear scarlet; preopercular spines more prominent, parallel. MADERENSIS, 2235.

2234. HELICOLENUS DACTYLOPTERUS[*] (De la Roche).

(Serran Imperial; Fanegal; Cardonniera; Scorfanudi Funal; Crabra.)

Head 3⅕; depth 2⅔. D. XII, 12; A. III, 5; lateral line 43. Body not much elevated, little compressed, the tail slender. Head large, little compressed; cheeks, opercles, and occipital region well scaled; no dermal flaps anywhere; suborbital stay strong. Mouth rather large, with teeth as usual on jaws, vomer, and palatines; lower jaw not projecting; maxillary extending to beyond pupil. Suborbital with a narrow raised smooth ridge, which ends in a spine at the base of the stay; preorbital narrow, its edge slightly spinous; interorbital space narrow, with 2 parallel raised ridges and a deep groove. Cranial ridges short, sharp, about as in *Sebastodes rosaceus;* preocular, supraocular, postocular, tympanic, occipital, and nuchal spines present; suprascapular spines sharp; no exoccipitals; opercular spines moderate; preopercular spines sharp, the second longest. Eye very large, 3 in head. Jaws naked. Gill rakers rather long and slender. Pectoral very narrow, the rays not procurrent below nor thickened, reaching anal; ventrals small, reaching past vent; anal small and low, its second spine a little stouter but not longer than third; dorsal low, little emarginate, the spines slender. Scales ctenoid, regularly arranged; no accessory scales. Color delicate scarlet red, the opercle and dorsal fin somewhat mottled with brownish. Deep water of the Atlantic; very common in the Mediterranean; occasionally off our coast, from Narragansett to Chesapeake bays. Here described from a specimen taken off Chesapeake Bay; a beautifully colored species. (Eu.) (*δάκτυλος*, finger; *πτερόν*, fin.)

Scorpæna dactyloptera, De la Roche, Ann. Mus., xiii, 1809, pl. 22, fig. 2, Iviça, Barcelona; Risso, Ichthyol. de Nice, 186, 1810; Günther, Challenger Report, Vol. i, pt. vi, 6, 1880; Jordan & Gilbert, Synopsis, 679, 1883.

Sebastes imperialis, Cuvier & Valenciennes, Hist. Nat. Poiss., iv, 336, 1829, Nice.

Sebastes dactylopterus, Günther, Cat., iii, 99, 1860.

Sebastoplus dactylopterus, Goode & Bean, Bull. Mus. Comp. Zool., x, No. 5, 214, 1883.

Helicolenus dactylopterus, Goode & Bean, Oceanic Ichthyology, 249, pl. 68, fig. 244, 1896.

2235. HELICOLENUS MADERENSIS, Goode & Bean.

(Boca Negra; Pai de Gato.)

Head 3; depth 3½ in total length. D. XII, 12; A. III, 5; P. 19; scales of lateral line 29 to 30. Eye 3 to 3½ in head, not projecting above profile. Interorbital space very deeply concave, strongly ribbed, scarcely ½ diameter of eye. Snout scarcely equal to eye. Suborbital stay not very prominent, scarcely at all or very feebly and inconspicuously aculeate, with generally only 1 slight spine. Preorbital spines only small, obsolete teeth on angles, the anterior larger; spines of preopercle large, equidistant, nearly equal, second slightly the largest; parallel, horizontal, nearly straight or slightly curved upward; scapula and suprascapula small, no humeral spine; nasal, preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present; spines of head becoming more obsolete in full-grown individuals. Lower jaw with symphyseal knob. Dorsal fin (as seen in figure) begins slightly behind upper anterior angle of opercle, and the roots of first and second spines seem close together; third spine highest, the following ones slightly decreasing to the eleventh, last soft ray forked; caudal truncate; second and third anal spines about equal, origin of fin under origin of soft dorsal; pectorals reaching beyond vent, rather abruptly truncate, fan-shaped, the base about equal to orbit; first 2 rays simple, following 9 branched, only the tips free, the last 8 simple, exserted for ½ their length. Ventrals reaching nearly to anal, inner ray not attached to body by membrane. No laciniæ on either head or body, each spine of dorsal tipped with a short filament. Scales ctenoid; cheeks, opercles, maxilla, and breast scaly; snout and lower jaw naked; soft dorsal, anal, and pectoral scaly at base; lateral line nearly straight, 29 to 30 scales, each with a little spine-like point directed toward the tail. Pale flesh color, with 5 darker or brighter irregular broad scarlet bands, often mottled or suffused with dusky, disappearing on middle of sides, the first and smallest under origin, the fourth under end of dorsal fin, the last at base of caudal; all fins scarlet without spots or bars; spinous dorsal mottled, its spines and filaments tipped with white; soft dorsal, ventral, and anal edged with white; head bright scarlet; opercle clouded with a large suffused patch of leaden or pale violet black; gill cavity deep mulberry black; back part of mouth and tongue and gullet more or less deep lead color, approaching black; front of mouth and tongue pale or whitish; iris golden or topaz, shaded with brown, pupil violet or opalescent. (Live examples taken in August most brilliant scarlet imaginable, with the bands deeper, but pure intense scarlet; eye singularly beautiful; anal fin broadly edged in front with white.) Peritoneum intense shining inky or mulberry black. Five to 7 cæca. Vertebræ 10+15, rarely 14, including aurostyle. Length 15 inches; probably breeding in summer. (Lowe.) Madeira Islands, rare (Lowe); off eastern coast of United States, from New York to Cape Hatteras and outward, and off the coast of western Florida, in 70 to 373 fathoms. (Goode & Bean.) Very closely related to *S. dactylopterus*, with which it has been confounded. (*maderensis*, from Madeira.)

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[*] The following points are taken from Goode & Bean's description of *Helicolenus dactylopterus:*

"Back arcuate; head 2½; 28 to 30 tubes, about 50 scales; dorsal fin inserted above inner upper angle of opercular flap; length of spinous portion considerably less than head; third spine longest, thence a gradual decrease to eleventh; height of soft dorsal considerably more than highest spine, the rays projecting far beyond the membrane; base of pectoral almost equal to longest rays, which reach vent; first 2 rays simple, following 9 branched, last 8 simple, slender, with nearly ½ the length of the rays free from membrane; color of back extending in transverse bands upon sides."

Sebastes imperialis, LOWE, Fishes of Madeira, 171, pls. 24 and 25, fig. 3, 1843–1860, Madeira; not of CUVIER & VALENCIENNES.

Helicolenus maderensis, GOODE & BEAN, Oceanic Ichthyology, 250, 1896, Gulf Stream, off Cape Charles, Virginia, at Fish Hawk Station 897, lat. 37° 25′ N., long. 74° 18′ W., in 157½ fathoms. (Type, No. 26723.)

Sebastes dactylopterus, GÜNTHER, Cat., II, 99, 1860; in part.

693. SCORPÆNA (Artedi[*]) Linnæus.

(SCORPION FISHES.)

Scorpæna, ARTEDI, Genera, 17, XX, 47, 1738.
Scorpæna, LINNÆUS, Syst. Nat., Ed. X, 266, 1758 (*porcus*).
Neosebastes, GUICHENOT, Mém. Soc. Sci. Nat. Cherbourg, XIII, 83, 1868 (*panda*).
Parascorpæna, BLEEKER, Versl. Ak. Amst. (2), IX, pt. 3, 296, 1876 (*picta*).
Pseudosebastes, SAUVAGE, Nouv. Arch. Mus. (2), I, 1878, III (*bougainvillii*).
Sebastapistes (GILL MS.) STREETS, Bull. U. S. Nat. Mus., VII, 62, 1877 (*strongia*).

Body oblong, somewhat compressed. Head large, not much compressed, naked above, and more or less uneven with spinous ridges, often with dermal flaps. Mouth large, with bands of villiform teeth on jaws, vomer, and palatines. Scales mostly ctenoid, of moderate size, often with skinny flaps. Dorsal fin with 12 stout spines; anal with 3 spines, the second commonly the longest; pectorals large, rounded, the base usually procurrent; some or all of the upper rays divided, the lower simple; ventrals inserted behind pectorals. No air bladder. Vertebræ 10 + 14 = 24. Species numerous in the tropical seas; fishes of singular forms and bright colors; the variation in squamation and armature very great, but, as in most similar cases, it is not easy to find definite characters for subdivision. (σϰόρπαινα, the ancient name of *Scorpæna scrofa*, from σϰορπίος, scorpion, in allusion to the dorsal spines, which inflict a very painful sting-like wound. The modern Greek name of Σϰόρπαινα (*Scorpæna scrofa*). According to Apostolides, σϰορπίος is now the common name of *Scorpæna porcus*. Σϰορπίος = scorpion. As name of a fish, Aristotle 1531*a*, 20, 508*b*, 17, 593*a* 7, 598*a* 14. It has many pyloric appendages, breeds (spawns) twice a year, alternates between the open sea and the shallow water along the shore; the σϰορπίδες, breed in the open sea (τὸ πέλαγος). (Athen., VII, 115. Num.) "Red σϰορπίος." Hicesius says: "Of the σϰορπίοι one kind is pelagic, the other, littoral; the former is a fiery red, the latter blackish." Epicharmus calls the σϰορπίος ποιϰίλος, variegated. It is solitary and eats seaweed. Aristotle mentions σϰορπίοι and σϰορπίδες in different places. It is not clear whether he means the same fish by these names. That we have frequently eaten both σϰόρπαινα and σϰορπίοι and that the flavors are different, no one is ignorant. Archestratus, in his "Golden Words," says: "Buy the small σϰορπίος, but beware of a big one." (Athen., VIII, 52.) The tawny, pelagic σϰορπίοι are more nutritious than the large ones of the shoal water near shore.) (Horace A. Hoffman.)

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[*] The following European species of *Scorpæna* has been attributed to our fauna, probably by error:

Scorpæna porcus, LINNÆUS. (Pig-foot; Scorpéne): D. XIII, 10; A. III, 5; lateral line 40. Body oblong, compressed; back somewhat elevated, highest at origin of spinous dorsal; suborbital stay close to eye, without any pit between it and the eye; supraocular flap broad, a little lower than eye; no flaps on posterior edge of preopercle, 4 on occipital region, few along lateral line; preocular, supraocular, tympanic, occipital, exoccipital, and nuchal spines present; a pit before occipital spines; opercular and preopercular spines short; maxillary reaching posterior margin of orbit. Scales present on postocular region and upper part of preopercle; scales on body somewhat regularly placed; breast naked. Fins high; pectorals much less procurrent at base than in *S. plumieri*, reaching beyond tips of ventrals, which reach anal; spines slender, the second anal slender, little longer than third. Gill rakers short and thick. Reddish brown, much mottled above with darker, and dotted with black; much less variegated than in *S. plumieri;* usually a black

- *a.* Breast scaly.
  - *b.* Occiput with a distinct quadrate pit.
    - *c.* Supraocular tentacle less than twice diameter of orbit.
      - *d.* Dorsal rays XII, 9.
        - *e.* Top of head scaleless, 3 small spines on suborbital carina. AGASSIZII, 2236.
        - *ee.* Top of head not wholly scaleless, the interorbital space incompletely scaled; suborbital carina with 6 spines. CRISTULATA, 2237.
      - *dd.* Dorsal rays XII, 10.
        - *f.* Anterior border of orbit with no distinct pit below it.
          - *g.* Suborbital stay with 3 distinct spines; third anal spine longer and stronger than second. BRASILIENSIS, 2238.
          - *gg.* Suborbital stay without spines; cheeks more or less scaly; second anal spine longer and stronger than third.
            - *h.* Pectorals 20, about 7 or 8 branched; ventrals reaching beyond vent; flap above base of pectoral with continuous edge. HISTRIO, 2239.
            - *hh.* Pectorals 19, about 10 branched; ventrals not reaching beyond vent; flap above base of pectoral much tattered. PANNOSA, 2240.
        - *ff.* Anterior border of eye with a distinct pit between it and suborbital stay.
          - *i.* Lateral line with about 50 scales; no dermal flaps except small ones along lateral line; supraorbital tentacles small; axil pale, mostly unspotted. GUTTATA, 2241.
          - *ii.* About 30 scales on lateral line, most of the scales with dermal flaps; supraorbital flap large, longer than eye; axil black, with large white spots.
            - *j.* Color rather pale or reddish; interorbital area narrow; occipital pit deep. PLUMIERI, 2242.
            - *jj.* Color blackish; interorbital space broader and flatter; occipital pit broader and less deep. MYSTES, 2243.
    - *cc.* Supraocular tentacle more than twice diameter of eye; flaps on lateral line longer than eye; suborbital stay with a small spine near its center, another at its posterior end; axil gray with many small white spots. GRANDICORNIS, 2244.
  - *bb.* Occiput with only a very shallow depression or none.
    - *k.* Pectoral with 4 or more branched rays.
      - *l.* Occiput with a very shallow but distinct depression; suborbtial stay evident, with several small spines. RUSSULA, 2245.
      - *ll.* Occiput with no depression, or only a slight crescentic notch; suborbital stay very low, a minute spine at its posterior end. SONORÆ, 2246.
    - *kk.* Pectoral with but 2 branched rays; no pit at occiput. INERMIS, 2247.

2236. SCORPÆNA AGASSIZII, Goode & Bean.

Head about 2⅓; depth about 3; eye 2½ in head. D. XII, 9; A. III, 5; P. 20; scales 5-47-11, 28 tubes in lateral line. Width of head about ½ its length; interorbital space nearly 5 in head. Supraocular ridge elevated above general profile, snout abruptly declivous and very short, less than ½ length of eye. Maxilla reaching posterior margin of orbit, 2 in head;

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blotch on posterior half of spinous dorsal. Southern Europe; a specimen said to have been sent to Cuvier from New York by Milbert, a statement extremely doubtful.

Scorpæna porcus, LINNÆUS, Syst. Nat., Ed. X, 226, 1758, Mediterranean and ocean; after *Scorpæna pinnulis* at *oculis et nares* of ARTEDI; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 300; GÜNTHER, Cat., II, 107.

mandible reaching beyond orbit, about 4 in length of body, a little less than 2 in head, with prominent symphyseal knob. Nasal spines small, 3 spines at top of orbit, 1 in front and 2 behind; 2 spines on each side of vertex and 1 on each side of nape; a tympanic and a humeral spine; two spines on opercle, 5 on preopercle, the first with a small supplementary spine at its base, the strong preorbital spines overhang supramaxilla; suborbital carina feeble, with 3 small spines. Top of head scaleless; sides of head incompletely scaled. Cephalic filaments all small, the longest above orbit, about 3 in eye. Gill rakers 6+7. Distance of spinous dorsal from tip of snout equals length of its base; first dorsal spine 2 in second; third to sixth about equal, 2 in head; penultimate spine 1⅓ in last, which is about equal to orbit; longest ray about 2 in head; caudal very long, its middle rays about 3 in length of body; anal origin under eleventh dorsal spine, its base 2⅗ in head, third spine very little longer than second, twice as long as first, about equal to orbit; longest ray little more than ½ head. Vent under tenth dorsal spine. Pectoral very long, longer than head, reaching to end of anal, the uppermost 1, and the lower 10 simple, the others branched; ventral reaching origin of anal, nearly ⅔ as long as head. Color above, light orange yellow, creamy white below lateral line; fins all pale. Length 3⅗ inches. Mid-ocean, N. lat. 23° 13′, W. lon. 39° 10′, east of Cuba. ("Named for Alexander Agassiz in recognition of his eminent services in deep-sea explorations.")

Scorpæna agassizii, GOODE & BEAN, Oceanic Ichthyology, 247, fig. 243, 1896, N. lat. 23° 13′, W. long. 39° 10′, station 259, Steamer Blake. (Type in M. C. Z.)

2237. SCORPÆNA CRISTULATA, Goode & Bean.

Head 2⅖, twice length of upper jaw; depth 3; depth of caudal peduncle equal to snout; eye nearly 3½ in head, ⅔ length of maxilla. D. XII, 9; A. III, 5; P. 23; scales about 8–60–15; lateral line tubes about 35. Interorbital space moderately concave, 4 in upper jaw, about 8 in head; mandible reaching to posterior margin of eye, slightly longer than postorbital part of head; teeth in villiform bands on jaws, vomer, and palatines, a naked space at symphysis of maxillaries. Anterior nostril nearer eye than tip of snout. A pair of spines on preorbital; 6 spines on suborbital carina; 5 on border of preoperculum, the uppermost largest, with a smaller supplementary spine at its base; nasal spines developed; 3 supraorbital spines on each side and 3 more on each side of the vertex and the nape; a postocular (?) spine, a tympanic and 2 humerals; 2 thin, flat spines on operculum. Nearly all spines of head with short filaments behind them, longest filaments above orbit, scarcely ⅓ of eye; anterior nostril tubular, with 2 dark-colored filaments. Gill rakers short, stout, the club-shaped extremity armed with minute spines; 4 developed, and 2 rudiments above angle, 8 developed on anterior limb, besides 5 sessile rudiments. Pseudobranchiæ present. Interorbital space incompletely scaled; supramaxilla finely scaled. Distance of spinous dorsal from tip of snout equals twice length of upper jaw, first spine equaling interorbital space, second nearly twice as long, third about 3 in head, penultimate little more than ½ length of last; longest soft dorsal ray ½ base of spinous dorsal. Caudal slightly rounded, middle rays nearly ½ of head. Origin of anal under last dorsal spine. Anal spines stout, second and third about equal, about twice as long as first, longest ray about 3 in head; ventral slightly longer than maxilla, not quite reaching vent; pectoral reaching vent; 1 upper and 8 or 9 lower rays simple, the other 13 divided. Color (in alcohol) light orange yellow, a faint dusky blotch on upper part of opercle; an irregular area of dusky under second half of spinous dorsal extending down to about middle of body; another ill-defined blotch ⅔ length of eye on basal half of soft dorsal; membrane of spinous dorsal beginning behind fourth spine intermingled with dusky. Length 6 inches. Only the type known. Deep water off coast of Georgia. (Goode & Bean.) (*cristulatus*, with a small crest or tuft.)

Scorpæna cristulata, GOODE & BEAN, Oc. Ichth., 246, fig. 242, 1896, N. lat. $30_{\circ}$ 44′, W. lon. 79° 26′, off Georgia, in 440 fathoms, at Albatross Station 2415. (Type, No. 39326.)
Scorpæna schinita, KÖHLER, Ann. Univ. Lyons, XXVI, 474, 524, pl. 27, figs. 4 to 6, 1896, Bay of Biscay, in 700 fathoms.

2238. SCORPÆNA BRASILIENSIS, Cuvier & Valenciennes.

Head 2⅗; depth 2⅔ to 3; orbit 4 in head. D. XII, 10; A. III, 5 (5½); transverse rows of scales (oblique) about 25 to 30, (vertical) 50 to 60; tubes 25 to 30. Body short, compressed, profile convex, depth of caudal peduncle a little less than 4 in head. Head compressed; interorbital space narrow, a little more than ½ orbit, about 7 in head, deeply concave, deepest between preocular spines, and with 2 marked longitudinal ridges on frontal bones, parallel with the supraocular ridges; a deep pit at the occiput, deepest behind, its anterior side sloping back from base of coronal (tympanic) spines, its posterior side nearly vertical; preocular, supraocular, postocular, and coronal (tympanic) spines moderate, parietal and nuchal spines sharpest, their ridges thin and sharp; exoccipital spines and ridges present; spine between orbit and occipital small, not bifid. Preorbital very broad, with 2 sharp spines; no pit between anterior inferior border of orbit and suborbital stay, the latter low, with 2 or 3 small spines; uppermost preopercular spine much the longest, a small spine at its base, the others very small or almost obsolete; opercular spines rather small, with not very prominent ridges; all ridges of head less prominent than in *Scorpaena plumieri*. Jaws equal, the lower with a small symphyseal knob; maxillary reaching posterior edge of pupil, about 2¼ in head; teeth on jaws, vomer, and palatines in rather narrow bands. Pseudobranchiæ reaching down nearly to epihyal bone; gill rakers short, compressed, about 7 on anterior limb. Dorsal fin deeply notched, membrane reaching halfway up the twelfth spine; dorsal spines slender, low, the longest equal to maxillary, about 2¼ in head; soft rays higher, about 1¾ in head; anal spines graduated, the second a little the thickest, soft rays 1⅗ in head; caudal truncate, or very slightly rounded; pectoral reaching beyond origin of anal, a little shorter than head, its base not procurrent, the 10 lower rays slightly thickened, exserted and simple, the upper rays (except the uppermost one) branched; ventrals reaching beyond vent, the last soft ray attached to the body for $\frac{3}{4}$ of its length by a rather broad membrane. Supraocular flap long and slender, longer than orbit, a little more than 3 in head; preocular flap small; flaps at base of spines of preorbital and lower spines of preopercle, small ones on cheeks, membrane of spinous dorsal, and on many of the scales of the body; larger flaps on lateral line and along base of dorsal fin. Scales large, rather smooth, with membranaceous edges; a few rudimentary scales on front and flap of opercle, on preopercle and lower part of cheek; breast with small scales. Color dusky olivaceous or brownish, whitish below; a few large diffuse dark spots on sides above, nearly as large as eye; the posterior part of each scale darker, giving a slight speckled appearance; axil pale with small dark spots, which are also sparsely present along lower part of sides; pectorals mottled, faintly banded, their lower part paler; spinous and soft dorsal and anal irregularly marbled; caudal with median and terminal blackish bands; ventrals dusky at tip; sides of head dark, with some small darker spots; snout, interorbital space, and tip of maxillary dark, faintly marbled; under side of head whitish or marbled with brownish; peritoneum white. Atlantic coast, from Charleston to Rio Janeiro. The specimens on which this description is based are from Pensacola, Florida. (*brasiliensis*, from Brazil.)

Scorpæna brasiliensis, Cuvier & Valenciennes, Hist. Nat. Poiss., IV, 305, 1829, Brazil; Günther, Cat., II, 112. 1860; Jordan, Cat. Fish., 109, 1885; Meek & Newland, Proc. Ac. Nat. Sci. Phila. 1885, 395, 399.

Scorpæna stearnsi, Goode & Bean, Proc. U. S. Nat. Mus. 1882, 421, Pensacola, Florida (Coll. Silas Stearns); Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 614; Jordan & Gilbert, Synopsis, 951, 1883.

2239. SCORPÆNA HISTRIO, Jenyns.

Head $2\frac{1}{6}$ ($2\frac{5}{6}$ in total length); depth $3\frac{1}{9}$ (4 in total length); width of head over preopercles $3\frac{3}{4}$; orbit high up, $4\frac{1}{3}$ in head. D. XII, 10; A. III, 5; P. 20; transverse (oblique) rows of scales 25; tubes of lateral line 23 to 25. Body compressed, its width at base of pectorals 2 in head; caudal peduncle short, its depth a little less than orbit. Head heavy, its depth and width equal. Interorbital space narrow, 2 in orbit, deeply concave, the concavity with sloping edges and rounded bottom, and without prominent ridges; preocular ridges very thick, prominent, with strong, prominent spines; supraocular ridges thin, high, with very blunt spines; postocular spines on rim of orbit, external and posterior to supraoculars; another small spine on rim of orbit below and a little behind postocular; the bifid spine a little behind middle of posterior margin of orbit, and behind this a small exoccipital spine with a thin prominent ridge; a pair of sharp "coronal" spines, with small pits in front of them; thin, rather high parietal and nuchal ridges, of about equal length, with blunt spines. Occiput with a pit of moderate depth, its longitudinal width $1\frac{4}{9}$ in its transverse width, continuous on each side, between "coronal" spine and parietal ridge, with a pit behind superior posterior border of orbit, its anterior side sloping backward, its posterior side nearly vertical, sloping slightly forward between anterior edge of parietal ridges. Nasal spines strong, nearly vertical. Preorbital very wide, without prominent ridges, its inferior border lobate, with 2 or 3 small spines; no pit under orbit, but a broad shallow depression under whole length of orbit; suborbital ridge quite far from eye, equidistant from lower edge of eye and upper edge of maxillary, its carina composed of 3 or 4 minor ridges, each beginning above the one in front of it and ending below the one behind it; a single small spine at posterior end of last ridge. Uppermost preopercular spine longest, a little below the line of suborbital ridge, with a small spine above its base in line with the ridge; the second, third, and fourth spines successively smaller, the fifth obsolete. Opercle with 2 somewhat diverging flat ridges, ending in strong spines; 3 thin, sharp, plate-like ridges on shoulder; first 2 scales of lateral line with bony keels. Mouth very large, nearly horizontal, wholly below inferior edge of orbit; maxillary reaching beyond posterior edge of orbit, very slightly more than 2 ($2\frac{1}{10}$) in head; jaws equal, the lower without prominent symphyseal knob; broad bands of teeth on jaws, vomer, and palatines. Pseudobranchiæ large, reaching down nearly to epihyal bone; gill rakers very short, broad, with many minute spines, about 12 in all, about 8 developed and 3 or 4 rudiments. Scales moderate, mostly cycloid (or very weakly ctenoid); vertex, interorbital space, snout, cheeks above suborbital ridge, and both jaws naked; smaller, embedded scales behind orbit, on base and flap of opercle, and below suborbital stay; breast scaly. Anterior nostril with laciniate flaps. Supraocular flaps minute; numerous flaps on sides of body and preopercle, preorbital, and under lower jaw; a few minute ones on sides of head. A very broad continuous flap, width about $1\frac{1}{2}$ in orbit, above base of pectoral, parallel with edge of opercle. Origin of dorsal opposite upper angle of gill opening, not deeply notched, the spines only moderately exserted; third and fourth spines equal, longest twice as long as first, about $2\frac{3}{4}$ in head, the following spines gradually and slightly decreasing to the eleventh, which is a very little longer than first; longest soft rays about equal to longest spine; caudal truncate, $1\frac{6}{7}$ in head; second anal spine a little longer than third, about $2\frac{3}{5}$ in head; soft rays a little longer than second spine, reaching base of caudal; pectoral $3\frac{1}{5}$ in length of body, reaching nearly to origin of anal, the base procurrent, its width $3\frac{1}{2}$ in head, the 11 or 12 lower rays a little thickened, simple, hardly at all exserted, the next 8 or 9 rays much longer, branched, the uppermost one simple; ventrals reaching a little beyond vent, 2 in head. Color in alcohol: Top of head and sides dark brown with a slight wash of cherry red, belly white; cheeks under eyes mottled with light and dark; 3 to 5 small dark bands or spots between orbit and suborbital stay; soft dorsal dark; membrane of spinous dorsal and base of soft dorsal strongly washed with cherry red; a similar spot on opercular flap; some of the flaps of the sides of same color, others white; pectorals with 3 dark bars alternating with lighter, the axils cloudy; caudal with 2 broad dark bars, the lighter bands much mottled with white; posterior part of sides with several white spots; a narrow black band across top of peduncle just in front of caudal;* peritoneum white. Length 9 inches.

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* Jenyns quotes Darwin's color notes: "Whole body scarlet red, fins rather paler, with small irregularly shaped black spots."

Panama to Juan Fernandez. The specimen from which this description is taken is from Charles Island, Galapagos Archipelago; recorded from Juan Fernandez, Galapagos Archipelago, Chinchas Islands, and Panama; a shore fish. (*histrio*, a stage player.)

Scorpæna histrio, JENYNS, Zool. Voy. Beagle, Fishes, 35, pl. 8, 1842, Chatham Island, Galapagos Archipelago (Coll. Darwin); GÜNTHER, Cat., II, 115, 1860; STEINDACHNER, Ichthyologische Beiträge, II, 8, 1875; JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 292; MEEK & NEWLAND, Proc. Ac. Nat. Sci. Phila. 1885, 395, 399; JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 182.

2240. SCORPÆNA PANNOSA, Cramer.

Head $2\frac{1}{4}$ ($2\frac{6}{7}$ in total length); depth 3 ($3\frac{3}{4}$ in total length); width at base of pectorals 4; width of head over preopercles $3\frac{3}{4}$. D. XII, 10; A. III, 5; pectorals 19; transverse (oblique) rows of scales 25; lateral line (tubes) about 25. Body compressed. Caudal peduncle short, its depth a very little less than orbit. Depth and width of head about equal. Orbit high up, $4\frac{1}{5}$ in head; interorbital space narrow, 2 in orbit, deeply concave, without prominent ridges; preocular ridges thick and prominent, with strong spines; supraocular ridges thin, with blunt spines; postocular spines on rim of orbit rather sharper; no small spine on rim of orbit behind and external to the postocular; a bifid spine behind middle of posterior rim of orbit, and behind this a thin exoccipital ridge with a blunt spine; a pair of sharp, broadly triangular "coronal" spines with small pits between them and the supraoculars; thin parietal and nuchal ridges of about equal length, with rather blunt spines; occipital pit of moderate depth, its longitudinal width $1\frac{5}{7}$ in the transverse width, its anterior side sloping backward, its posterior side sloping slightly backward, forming a shallow pocket in posterior part of pit; the pit is continuous on each side between coronal spine and parietal ridge, with a pit behind postero-superior border of orbit; nasal spines sharp, strong; preorbital very broad, with moderate ridges, its inferior border lobate, with 1 small spine directed forward, another downward; no pit under orbit, but a broad, shallow depression between orbit and suborbital ridge; suborbital ridge well separated from eye, equidistant from lower rim of orbit and upper edge of maxillary, and composed of 3 or 4 minor ridges, each beginning above the one in front of it, and ending under the one behind it; a single small spine at posterior end of last ridge; uppermost preopercular spine longest, a little below the line of the suborbital ridge; above its base is a small spine nearly in line with the ridge; second, third, and fourth preopercular spines successively smaller, the fifth obsolete; opercle with 2 diverging flat ridges with strong spines; three thin, sharp ridges on shoulder; first 2 scales of lateral line with bony keels. Mouth large, nearly horizontal, wholly below inferior rim of orbit; maxillary reaching about to posterior margin of pupil, $2\frac{1}{4}$ in head; jaws equal, the lower without prominent symphyseal knob; broad bands of teeth on jaws, vomer, and palatines. Pseudobranchiæ large, reaching down nearly to epihyal bone. Gill rakers very short, broad, with many minute spines; about 6 developed, the anterior rudiments tending to form a continuous spinous ridge. Scales moderate, mostly cycloid (or very weakly ctenoid?); vertex, interorbital space, snout, both jaws, and cheeks above suborbital stay, naked; small embedded scales behind orbits, on cheeks below suborbital stay, on base and flap of opercle; scales on breast small. Anterior nostrils with broad, leaf-like laciniate flaps; preocular flaps minute, supraocular flaps long, more than $\frac{1}{2}$ orbit, about $\frac{1}{3}$ as broad as long; numerous flaps on back and sides, on opercle, and edge of preopercle and preorbital; a few small ones on cheek and on eye above pupil; a large, much-incised and divided flap above base of pectoral parallel with edge of opercular flap, its length about $1\frac{1}{2}$ in orbit. Origin of dorsal opposite upper angle of gill opening; dorsal fin not very deeply notched, the spines only moderately exserted, third and fourth spines equal, about $2\frac{3}{4}$ in head, the following spines decreasing to the eleventh, which is $1\frac{1}{3}$ times as long as the first; longest soft rays about equal to longest spines; caudal truncate or very slightly rounded, $1\frac{3}{4}$ in head; second anal spine a little longer than third, about $2\frac{1}{2}$ in head; soft rays a little longer than second spine, not quite reaching base of caudal; pectorals about $3\frac{3}{10}$ in length of body, reaching nearly to origin of anal; the base procurrent, its width about $3\frac{1}{2}$ in head; rays 19, lower 8 simple, slightly exserted and thickened, the next 10 branched, much longer, the uppermost simple; ventrals reaching only to vent. General color apparently scarlet; cheeks under orbits mottled with small, dark, mostly round spots; dorsal and pectoral pale, with slight cloudings and small spots of dark; flaps of sides pale or scarlet, caudal with 2 faint cross bars of dark spots, faint white spots on the lighter bands; no trace of white spots on posterior part of sides, and no trace of dark band across top of caudal peduncle; axils pale, with apparently 3 or 4 darker spots; a large dark spot on side behind opercular flap; 2 narrow dark bands under posterior half of spinous dorsal, reaching on to abdomen, a broader one under soft dorsal; peritoneum white.

This species is very closely related to *Scorpæna histrio*, Jenyns, from which it differs in the following points:

Scorpæna pannosa.	*Scorpæna histrio.*
Nineteen pectoral rays, the lower 8 simple, the next 10 branched, the uppermost simple.	Twenty pectoral rays, the lower 11 or 12 simple, the next 7 or 8 branched, the uppermost simple.
Occipital pit deeper behind, its posterior wall slanting backward. Its longitudinal width $1\frac{5}{7}$ in the transverse width.	Longitudinal width of occipital pit $1\frac{4}{9}$ in the transverse width.
Maxillary does not reach posterior border of orbit, $2\frac{1}{4}$ in head.	Maxillary reaches beyond posterior border of orbit, very slightly more than 2 ($2\frac{1}{10}$) in head.
Ventral fins reaching only to vent.	Ventral fins reaching beyond vent, about $\frac{1}{3}$ of distance from vent to front of anal.
Soft rays of anal not quite reaching base of caudal.	Soft rays of anal reaching base of caudal.

Scorpæna pannosa.	*Scorpæna histrio.*
Broad flap above base of pectoral much incised and tattered.	Broad flap above base of pectoral with a nearly continuous head.
Gill rakers fewer, the rudiments on the front part of the anterior limb apparently forming a continuous spinulous ridge.	
No small spine on rim of orbit behind postocular spine.	A small spine on rim of orbit behind postocular spine.
No trace of white spots on posterior parts of sides or of a small dark bar across back of caudal peduncle.	Several white spots on posterior part of sides, and a small dark bar across back of caudal peduncle.
A distinct large dark spot on side behind opercular flap. Pectorals and soft dorsal with very little dark.	No distinct dark spot on side behind opercular flap. Pectorals and soft dorsal with much dark.
General color in alcohol faded scarlet.	General color in alcohol dark brown and cherry red.
Supraocular flap large, more than ½ orbit.	Supraocular flap small.

In his original description of *Scorpæna histrio* from Galapagos Islands (length 9 inches), Jenyns gives the following details: Maxillary reaching posterior margin of orbit; small spine on rim of orbit behind postocular spine present only on left side (entirely absent in a smaller specimen); conspicuous (large) palmated supraocular flaps; eleventh dorsal spine a little longer than the first; 20 pectoral rays, the 10 lower simple, the next 9 branched, the uppermost one simple. His 2 specimens exactly agree in number of fin rays. The plate accompanying his description (both description and plate based on same specimen) gives the 12 lower pectoral rays simple.

Unfortunately, we have only 1 specimen of *Scorpæna histrio* from Galapagos Islands and 1 of *S. pannosa* from Panama for comparison. It would be very desirable to have a series for comparison in order to determine the amount of variation in the color and in the other points in which the 2 species differ from each other. (Cramer.) Panama; only the type (7½ inches long) known. (*pannosus*, tattered; referring to the shoulder flap.)

Scorpæna pannosa, CRAMER, in GILBERT, Proc. U. S. Nat. Mus. 1896, 446, pl. 42, Panama. (Type, No. 47573, U. S. Nat. Mus. Coll. *Albatross*.)

2241. SCORPÆNA GUTTATA, Girard.

(SCORPENE; SCORPION; SCULPIN.)

Head 2⅜ to 2⅔; depth 3 to 3¼. D. XII, 10; A. III, 5; lateral line 30 (tubes), 50 to 60 scales. Body robust, little compressed; interorbital space not very deeply concave; a pit at the vertex in front of occipital ridges, much broader than long, narrowest at the middle line, its anterior edge running outward and forward on each side to base of tympanic spine. Mouth very broad, little oblique, lower jaw included; maxillary very broad posteriorly, 2⅕ in head, reaching posterior margin of orbit. Gill rakers very short, broad, compressed. Cranial spines bluntish, high; preocular, supraocular, postocular, tympanic, parietal, nuchal, and occipital spines present, besides a bifid spine between the exoccipital and orbit; upper preopercular spine much the longest; opercular spines not large; suprascapular spines 3, knife-like; the preorbital with 3 or 4 moderate ridges diverging forward and ending in spines; a small distinct pit between lower anterior margin of orbit and suborbital stay, the latter moderately carinate, with sometimes 2 or 3 bluntish spines. Head naked; breast and regions before pectorals covered with small embedded scales (with exception of opercular flap); anterior margin of preorbitals, margin of preopercle, and nostrils with skinny flaps; a rather small flap behind preocular spine, a larger one between supra and post ocular spines, a little more than 2 in orbit, besides several smaller ones on various parts of the head. Scales small, nowhere distinctly ctenoid; nearly every scale on the upper parts of body with a small membranaceous flap, the flaps larger along lateral line. Dorsal spines high, higher than the soft rays, the longest 2⅕ in head; second anal spine longest and much the strongest, 3 in head; pectoral very broad, short, and rounded, its lower rays procurrent, its tip reaching beyond the ventrals to vent, its base more than ⅓ in head, its length 3½ in body, the 10 lower rays simple, thickened, the rest (except the uppermost one) branched; caudal rounded. Brown, irregularly mottled and blotched with rosy purplish and pale olive; opercles and cheeks, a bar behind eye, and 5 or 6 large blotches at base of dorsal, purplish; head, back, and sides with many small round dark-olive spots; belly unspotted; thoracic region pink; spinous dorsal blackish, its middle part with many roundish pale spots, forming a continuous stripe, besides smaller black spots; caudal and pectoral with vertical bars of dark and pale spots; soft dorsal and anal spotted; ventrals pinkish, little spotted; jaws and branchiostegals yellowish, more or less mottled; axil pale, with round dark spots; peritoneum white. Length 12 inches. Pacific coast of America, from Monterey to Ascension Island, on the west coast of Lower California; very abundant about San Diego; a good food-fish. Here described from San Diego specimens. (*guttatus*, speckled.)

Scorpæna guttata, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 145, Monterey (Coll. Lieut. Trowbridge); GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 77, pl. 17, figs. 1 to 4, 1858; JORDAN & GILBERT, Synopsis, 679, 1883; MEEK & NEWLAND, Proc. Ac. Nat. Sci. Phila. 1885, 396, 399.

Sebastapistes guttatus, STREETS, Bull. U. S. Nat. Mus., VII, 62, 1877.

2242. SCORPÆNA PLUMIERI, Bloch.

(RASCACIO.)

Head 2½ in length; depth 3. D. XII, 10; A. III, 5; lateral line 40 (rows of scales) about 25 pores. Body short and thick. Head irregular in form, with numerous grooves and pits, and many fleshy flaps; a large deep pit below the eye, between it and the front of suborbital stay; supraocular flap at least as high as eye; large flaps on preorbital and edge of preopercle, preocular, supraocular, postocular, coronal (tympanic ?), parietal, nuchal, and exoccipital spines present; a deep pit behind coronal spines, as long as broad; preopercular and opercular spines moderate, bluntish, suborbital stay prominent, with 3 or 4 sharp spines; a few scales on preopercle and opercular flap; head otherwise naked; maxillary reaching to behind eye, not quite ½ head; lower jaw included; breast covered with small embedded scales; scales of body large, not ctenoid, firm, many of them with membranaceous flaps; lateral line with a series of fleshy flaps. Dorsal low, the highest spine 2¾ in head, somewhat lower than the soft rays; pectorals very broad, procurrent, reaching about to front of anal fin; second anal spine very robust, 2⅗ in head, much larger than third; the ridges, spines, and grooves of head all exaggerated; a small bifid spine between orbit and exoccipital spine; interorbital space deeply concave, the pit at occiput bowl shaped; maxillary reaching nearly to posterior margin of eye; jaws about equal; teeth on jaws in rather broad bands, those on vomer and palatines in narrow bands; gill rakers very short, as broad as high; pseudobranchiæ large; orbit high up, 5 in head; preorbital wide, corrugated with about 4 radiating ridges, its inferior border with 3 blunt spines; base of pectoral 2½ in head, the 10 or 11 lower rays simple, a little thickened and exserted, the upper rays (except the uppermost one) branched; second anal spine somewhat longer than third. The color highly variegated, subject to much variation; sand color, with 2 broad blackish shades on the body and 1 on the head; belly purplish; lower side of head finely speckled in all shades of light, dark, and pearly bluish; upper parts covered with whitish cirri and profusely speckled, the surface looking as if covered with sand; eye with radiating dark spots; dorsal covered like body, with some well-marked whitish spots; dark band of body passing on to second dorsal; caudal variously mottled, with 3 pale and 3 black bands; anal whitish, variegated with reddish and black; ventral similar, with more maroon red; pectoral still more variegated, the tip scarlet shaded; inside of pectoral largely bright yellow, then blackish, tinged with cherry red; axil jet black, with large, round, white spots; lips barred with black and whitish; membranes and angle of mouth light bright yellow; peritoneum white. Some examples, especially old ones, taken in red algæ, largely scarlet on body and fins. West Indies and Brazil, north to Florida; very common everywhere from the Florida Keys southward. (Named for Father Charles Plumier.)

Scorpæna plumieri, BLOCH, Nya. Handl. Stockh., x, 234, 1789, Martinique; BLOCH & SCHNEIDER, 194, 1801; GÜNTHER, Cat., II, 113, 1860; JORDAN & GILBERT, Synopsis, 680, 1883; JORDAN, Proc. U. S. Nat. Mus. 1884, 137; MEEK & NEWLAND, Proc. Ac. Nat. Sci. Phila. 1885, 396, 400; GÜNTHER, Challenger Report, Shore Fishes, vol. I, Part VI, 9, 1880.
Scorpæna bufo, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 306, 1829, Martinique.
Scorpæna rascacio, POEY, Synopsis, 303, 1868, Havana.

2243. SCORPÆNA MYSTES, Jordan & Starks.

(LAPON.)

Head 2⅓; depth 3⅓. D. XII, 10; A. III, 5; scales about 30; orbit 6½ in head; maxillary 2; pectoral 2; highest dorsal spine 3½; second anal spine 3; caudal 2. Body robust, not much compressed; interorbital space wide, not deeply concave, ½ wider than orbit; a pit between preorbital and eye, and a broad depression behind coronal spines; membranaceous flaps on preorbital, edge of preopercle, over nostrils, and above eyes; preocular, supraocular, tympanic, coronal, occipital, nuchal, and exoccipital spines present. Maxillary reaching to behind eye; lower jaw included. Gill rakers short and thick, about 3+6; head naked, with the exception of a few embedded scales on preopercle and posterior part of opercle; scales on body large, many of them with membranaceous flaps. Olive brown, almost black, marbled with light drab; opercular flap with pale edge; the fins much spotted and marbled, all except spinous dorsal, with white margin, more distinct in the young; caudal fin showing 3 indistinct cross bars; axil jet-black, with white spots. Allied to *Scorpæna plumieri* Bloch, which species it represents on the Pacific Coast and from which it differs in having a wider and flatter interorbital area; the lower jaw wider and more rounded in front; the knob at symphysis not so sharp and projecting; the pit behind coronal spines broader and not so deep, and the color darker. Length 15 inches. Pacific coast of America, Guaymas to Panama, generally common on rocky shores. (*μύστης*, priest.)

Scorpæna mystes. JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 491, pl. 52, Mazatlan. (Types, Nos. 1501, 1616, 1617, 2919, L. S. Jr. Univ. Mus. Coll. Hopkins Exp. to Mazatlan.)

2244. SCORPÆNA GRANDICORNIS,* Cuvier & Valenciennes.

(LION FISH.)

Head 2½; depth 2¼. D. XII, 9; A. III, 5; lateral line 26 (pores). Body rather stout; deeper than in *Scorpæna plumieri* and much less variegated in color; sides and head with dermal flaps; flaps on lateral line long; a slight depression below eye; "coronal" spines none; suborbital stay with about 2 small spines, 1 near middle, the other behind; occipital pit very deep; spines of head sharp; a few scales on opercle; breast with rudimentary scales; supraocular flap very large, wide, and fringed, more than ½ length of head, reaching to beyond front of dorsal; eye about 4 in head; maxillary reaching posterior margin of eye, 2⅓ in head. Dorsal spines higher than in related species, the highest equal to second spine of anal and about ½ head. Gray, with brown shades and faint cross bars; sides with numerous bright yellow spots in life; axil dark gray, with round, white dots, each surrounded by a dark ring; pectoral largely blackish above, a black blotch at base below, the fin largely tinged with yellow, especially on the inner side; supraocular filament blackish, with gray fringes; soft dorsal largely blackish toward the tip; spinous dorsal chiefly dusky; ventral tipped with blackish; anal with 3 black bands, caudal with 2, a faint band at its base. Florida Keys to Brazil; common in shallow water among algæ; a fish of striking appearance, much dreaded by the fishermen. The specimens here described from Key West. (*grandis*, large; *cornu*, horn.)

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* The shore species of *Scorpæna* found in the waters of the United States may be distinguished by the color of the axillary region, as follows:

S. guttata, pale, usually unspotted; 1 or 2 dark spots behind it.
S. plumieri, jet-black, with a few large white spots.
S. brasiliensis, pale, with several round, blackish spots.
S. inermis, pale, with dark specks, and a dark spot above.
S. grandicornis, dusky gray, with numerous white stellate spots. (Jordan.)

Scorpæna grandicornis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 309, 1829, Martinique, Porto Rico, Havana, San Domingo; GÜNTHER, Cat., II, 114, 1860; POEY, Synopsis 303, 1868; JORDAN, Proc. U. S. Nat. Mus. 1884, 138; JORDAN, Cat. Fish., 109, 1885; MEEK & NEWLAND, Proc. Ac. Nat. Sci., Phila. 1885, 396, 401.

2245. SCORPÆNA RUSSULA, Jordan & Bollman.

Head 2⅓ to 2½ (3 to 3⅙); depth 3⅕ to 3⅓ (4 to 4¼). D. XII, 10; A. III, 5; lateral line 45 to 47. Body robust, compressed; back little elevated; profile very gently arched from snout to origin of spinous dorsal. Eye large, 3½ in head. Mouth large; maxillary reaching posterior margin of pupil, 2 in head. Snout 4½ in head. Interorbital space narrow, concave, its width a little less than ⅓ eye. Occipital and suborbital pits absent. Gill rakers short and thick, 5 or 6 developed. Nasal spines short and sharp, not longer than length of nostrils; preocular spine very prominent, larger than others on top of head; supraocular spine not so strong as postocular and tympanic, which are close together, the latter followed by a low striate ridge which bears the low occipital and nuchal spines; no coronal spines; temporal ridge prominent, ending in a spine, and with 2 blunt spines in front; below these, and about halfway to suborbital stay, another small and blunt spine; preorbital with 2 large forward projecting spines in front; suborbital stay with a prominent ridge which bears a small spine below anterior margin of pupil, and 2 more behind posterior margin (in the young the first of these 2 is absent). Preopercle with 4 distinct spines, besides some 4 smaller projections, the largest spine with a small one immediately below; opercular spines 2, large and sharp, the lower the longer. Scales small, scarcely ctenoid, those on belly much reduced; breast and region in front of pectorals and ventrals scaled; antedorsal region with 3 or 4 rows of embedded scales; temporal region with a few embedded scales; cheek with about 4 rows of large scales below the suborbital stay; membrane of opercles with a few scales, the opercle itself naked; scales of body without fleshy flaps. Supraorbital tentacle developed in the young, disappearing in the adult. Dorsal spines not as high as soft rays, the fin deeply notched; first spine 2 in eye, second 1⅖, third almost equaling eye, fourth and fifth almost equal, 3 in head, twelfth 3¼ in head; longest soft ray of dorsal 2½ in head; first anal spine 2¼ in second or 2 in eye, second anal spine longer than third and equal to eye; longest soft ray equaling that of dorsal; pectorals long, 1½ in head, the lower 14 rays simple, the next 6 branched, the uppermost 1 simple; ventral reaching vent, very slightly more than 2 in head; caudal equal to pectoral. Color, dark brown above, probably crimson in life, pale below level of upper half pectorals; upper half of head dark but without any distinct spots, the back more or less mottled with dusky; spinous dorsal with a dusky band at base and another across its middle; soft dorsal dark at base and with 3 or 4 irregular rows of small, obscure brownish spots; caudal tipped with black, traces of a narrow dark bar across its middle; pectorals slightly tipped with black, the middle slightly mottled; ventrals and anals pale or with traces of black on tips of rays; peritoneum white. Length 6 inches. Pacific coast of Colombia. Numerous specimens were dredged at a depth of 33 fathoms at *Albatross* Stations 2795 and 2797. (Jordan & Bollman.) (*russulus*, reddish.)

Scorpæna russula, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 165, Pacific coast of Colombia. (Type, No. 41160. Coll. *Albatross*.)

2246. SCORPÆNA SONORÆ, Jenkins & Evermann.

Head 2½ (3 in total); depth 3½ (4½); eye 3 in head. D. XII, 10; A. III, 5; scales 6–47–15. Body oblong, slightly compressed; back not greatly elevated; profile gently arched from snout to origin of first dorsal, and but little convex from there to caudal fin; ventral profile nearly straight to origin of anal, where it makes a broad angle with line to base of caudal. Head large, little compressed. Mouth large, oblique; maxillary large, triangular, 2½ in head, extending to posterior margin of pupil; premaxillaries with a deep sinus at the middle of their anterior margin into which fits the slightly projecting lower jaw. Occiput having no distinct pit; no pit between the lower anterior margin of the orbit and suborbital stay. Teeth in villiform bands on jaws, vomer, and palatines. Suborbital with a sharp ridge bearing 3 small spines, these in a line with a strong spine on the preopercle; nasal spines small, with a prominence between them made by the upper posterior tips of the premaxillaries; the preopercular spine the largest; the supraocular ridge with 2 small spines a little behind middle of eye; on the upper posterior margin of the orbit a strong tubercle rising into 3 small spines from which a well-developed occipital ridge extends backward, ending in a sharp spine; tympanic spines quite small; coronal ridges quite prominent, with at least 3 distinct spines on each; nuchal spines well developed; opercle with 2 strong ridges, both beginning at the same point on a level with the pupil and at a distance from it equaling diameter of eye, the lower one running nearly horizontally backward across the opercle, while the upper and weaker one diverges from it at an angle of about 30 degrees and extends to the lateral line; the length of each of these ridges equaling diameter of eye, both ending in spines; five preopercular spines, the uppermost much the largest, in a line with the suborbital ridge, and with a very small spine on its ridge near the middle; the second, or next spine below, is very short and inconspicuous; the third short and broad and projecting slightly downward; the fourth smaller than third and inclined still more downward; while the fifth is still smaller and projects nearly at right angle with the first; suborbital ridge prominent, bearing 2 small spines, the anterior one directly beneath the pupil, the other at anterior edge of preopercle. Origin of spinous dorsal a little in front of opercular flap, its distance from snout 3 in body to base of caudal; first spine short, less than snout in length; second spine equaling eye; third equaling distance from tip of snout to middle of pupil; fourth, fifth, and sixth each a little longer; the remaining 4 gradually shorter, the eleventh about as long as first, thus making the fin emarginate; all rather strong and pungent; the next spine slender, greater than eye in length; distance from base of dorsal to caudal not equaling height of the former; anal moderate, its height a little greater than its length, its origin under beginning of soft dorsal; the first spine shorter than second spine of dorsal; the second much stronger and longer, $\frac{1}{2}$ length of head, longer than longest dorsal spine; third more slender, shorter, about equaling longest dorsal; soft rays about equaling longest spine; anal and dorsal fins equally distant from caudal; pectorals long, $1\frac{3}{10}$ in head, their tips just passing first anal spine, inserted a little in advance of ventrals and much below axis of body; the upper rays branched; ventrals close together, moderate, just reaching vent; caudal moderate, about equaling pectorals in length. Cheeks well scaled, opercles nearly naked, occipital region with a few poorly developed scales; body covered with moderate cycloid scales, about 47 in a longitudinal and 21 in transverse series; the lateral line beginning at the upper angle of opercle, then curving downward to a line vertical from the tips of the ventrals, and then upward to near middle of base of soft dorsal, from which it is nearly straight to caudal fin; but few dermal flaps upon scales. Coloration in alcohol: body pale below, dark above, mottled with darker; head dark, snout and jaws covered with fine punctulations; a dark blotch between the eyes, an irregular blotch extending from below eye to edge of opercle, and another on suborbital just below pupil; spinous dorsal with 3 dark blotches at base extending onto body, outer edge mottled with black; soft dorsal with a dark spot at the base, a black spot greater than diameter of pupil on middle of outer part, and another on the tips of the last rays; pectorals with 2 distinct black bars and mottled with black near the base, the narrow outer edge white; axilla pale; ventrals white on anterior half, the terminal half black; anal white, tips of last rays with a black spot; caudal with 3 black bands, the first partly on the peduncle, the second about equaling $\frac{1}{2}$ the eye in width, the posterior edge at middle of fin; the third on tip of fin, about equaling snout in width. (Jenkins & Evermann.) Length about 4 inches. West coast of Mexico; Guaymas, Mazatlan, etc. Common in shallow water. A small species, closely allied to the group called *Pontinus*.

Scorpæna sonoræ, JENKINS & EVERMANN, Proc. U. S. Nat. Mus. 1888, 150, Guaymas, Sonora (Type, No. 39644. Coll. Jenkins & Evermann); JORDAN, Fishes of Sinaloa, in Proc. Cal. Ac. Sci. 1895, 492.

2247. SCORPÆNA INERMIS, Cuvier & Valenciennes.

Depth $4\frac{1}{2}$ in total length. D. XII, 8; A. III, 5; P. 19. Body elongate; opercular lobe short, $2\frac{4}{5}$ in head; eye $3\frac{1}{2}$ in head, equal to snout; interorbital space concave, 5 in diameter of eye; orbit high up, maxillary reaching posterior border of orbit; 2 pores along the lower jaw; the first suborbital with 2 spines on its inferior border; preopercle spinous as in *S. plumieri*, the other spines in the head less pronounced; the internal spine ("coronal") of the principal frontal lacking; suprascapular with 2 parallel spines; spines of dorsal unequal; pectoral rounded, its first 2 rays simple but articulated, the next 2 branched, the following 14 simple; second anal spine very short, about ·3 in height of body, almost equal to diameter of eye; occiput without pit; supraorbital flap quite short, a very small one at the nostril; some small filaments on the sides and on lateral line. General color that of *S. grandicornis,* Cuvier, marbled with yellowish and brown, the belly paler; an obscure blotch on subopercle, another on inferior base of pectoral; caudal with 3 vertical brown bands on a yellowish ground, 1 at base of fin, the second in middle, the third terminal; eye marked with red and yellow; axillary region entirely whitish; no small white points on the scales of this region. Length 3⅗ inches. (Poey.) West Indies, north to Florida; recorded from Martinique, Havana, and Clearwater Harbor, Florida. This species, with only 2 of the pectoral rays branched (Goode & Bean, in their description of the Florida type, say "rays all or nearly all simple"), seems to form a transition to the genus *Pontinus,* which can be distinguished from *Scorpæna* only by the undivided condition of the pectoral rays. (*inermis,* unarmed.)

Scorpæna inermis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 311, 1829, Martinique. (Coll. M. Richard.)

Scorpæna occipitalis, POEY, Memorias, II, 171, 1860, Havana; POEY, Synopsis, 303, 1868; JORDAN, Cat. Fishes N. A., 109, 1885; MEEK & NEWLAND, Proc. Ac. Nat. Sci. Phila. 1885, 397, 402.

*Scorpæna calcarata,** GOODE & BEAN, Proc. U. S. Nat. Mus. 1882, 422, Clearwater Harbor, Florida (Type, No. 23566. Coll. Dr. J. W. Velie); JORDAN & GILBERT, Synopsis, 952, 1883.

694. PONTINUS, Poey.

Pontinus, POEY, Mem. Hist. Nat. Cuba, II, 172, 1860 (*castor*).

Sebastoplus, GILL, Proc. Ac. Nat. Sci. Phila. 1863, 208 (*kuhlii*).

This genus differs from *Scorpæna* chiefly in having the pectoral rays all simple and their tips only free; anal with 5 to 9 rays; suborbital keel composed of 3 or 4 distinct, differentiated spines, 2 prominent retrorse spines on each preorbital. No pit at occiput; scales ctenoid; cheeks and opercles usually scaly; pectorals not procurrent. The American species all have D. XII, 10; A. III, 5. (*pontinus; pons,* a bridge, referring to the suborbital stay.)

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* Here is given Goode & Bean's description of *Scorpæna calcarata,* which species Jordan and Meek & Newland have identified with *Scorpæna occipitalis,* Poey:

Scorpæna calcarata, GOODE & BEAN: Depth 3. D. XI–I, 9; A. III. 5; P. 19; lateral line 28 (25 tubes). Body moderate, robust; eye large, nearly 3 in head; lower jaw slightly projecting, with a small symphyseal knob; maxillary reaching past pupil, its length ½ head; preorbital with 3 diverging spines; suborbital without pit, the bony stay moderate, armed with 2 small spines; nasal spines small; interorbital space narrow, with 2 longitudinal ridges, its width ⅖ length of eye; cranial ridges rather low, with sharp spines, arranged as in *Scorpæna stearnsi.* Occipital cavity almost obsolete, represented by a slight depression; preopercular spines 5, the lowermost stout, directed downward and forward, the uppermost rather long, more than ½ eye; opercular and scapular spines moderate; supraocular flaps minute, a few other small flaps on head; cheeks with rather large imbricated scales; opercle with some scales anteriorly and on its flap; breast scaly; scales of body large, not ctenoid, with few dermal flaps or none; pores of lateral line very conspicuous; gill rakers short and small; dorsal spines rather slender, the longest 2⅔ in head; longest soft ray 2½ in head; anal spines small, the second and third subequal, 3 in head; last ray largely united to belly by a membrane; soft anal rays moderate; ventrals reaching past vent, 1⅗ in head; pectoral long, 1⅕ in head, its base oblique (procurrent), 2½ in head, the rays all (or nearly all) simple. Color essentially as in *Scorpæna stearnsi* (*brasiliensis*); axil of pectoral whitish, with dusky specks, a black spot at its upper edge; ventrals mostly black. (Goode & Bean.) Clearwater Harbor, Florida.

- *a.* Base of pectoral broad, the fin fan-shaped.
    - *b.* Snout naked above as is the interorbital space.
        - *c.* Eleventh dorsal spine nearly as long as twelfth; maxillary 2 in head; interorbital space 10 in head; eye 3 in head (young specimen). Uniform rosy, intermingled with pearly white. MACROLEPIS, 2248.
        - *cc.* Eleventh dorsal spine ½ as long as twelfth.
            - *d.* Eye 5½ in head; maxillary reaching ⅔ across eye; head 4 in total length; spinous dorsal low; pectoral pointed; supraorbital tentacle 5 in total length; carmine red, without marblings. CASTOR, 2249.
            - *dd.* Eye 4 in head; maxillary reaching anterior third of orbit; spinous dorsal high; pectoral rounded; carmine red, with vertical rosy bands. POLLUX, 2250.
    - *bb.* Snout fully scaled above; interorbital space with few scales, top of head otherwise entirely scaly. RATHBUNI, 2251.
- *aa.* Base of pectoral narrow.
    - *e.* Head without filaments; nape and top of snout scaly; ventrals reaching vent. Pectoral rays 16. LONGISPINIS, 2252.
    - *ee.* Head with simple slender filaments; top of head, including interorbital space and top of snout, entirely scaled; ventrals not reaching vent. Pectoral rays 18. SIERRA, 2253.

2248. PONTINUS MACROLEPIS, Goode and Bean.

Head about 2¼; depth about 3; depth of caudal peduncle equal to snout. D. XII, 10; A. III, 5; P. 17. Width of head about 2 in its length. Scales 6–22 (tubes)–10. Interorbital space deeply concave, 2 in snout, 10 in head. Eye about 3 in head (in a young individual). Post orbital part of head 2 in distance from tip of snout to origin of spinous dorsal. Maxilla reaching beyond middle of eye, 2 in head; mandible reaching to posterior border of eye, about 2 in head, equal to length of ventral fin. Teeth in villiform bands on jaws, vomer, and palatine; a naked space at symphysis of intermaxillaries, into which fits a projecting spur at tip of mandibles; mandible with slight symphyseal knob and 3 large pores along middle of its surface. Nasal, preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present; a paroccipital spine and 2 humerals; 2 stout, flat spines on opercle, 4 on preopercle, uppermost largest, and with supplementary spine at its base, third larger than second or fourth. Suborbital carina consisting of 3 spines; 2 on preorbital, both bending backward. Four rudiments and 2 developed gill rakers above angle, 9 developed rakers on anterior limb of arch, developed rakers with small knob at tip. Preocular filament very short; supraocular filament about 3 in eye. Anterior nostril tubular, with thin narrow flap; distance between anterior nostril and eye equals interorbital width; posterior nostril not tubular. Scales larger than in *Pontinus longispinis* or *castor*. Interorbital space and top of snout scaleless; head otherwise entirely scaly. Distance of dorsal from tip of snout twice the maxilla; first spine ⅔ of second; third longest, about 2½ in head; penultimate spine about 5, and last spine 4 in head; first and last spines equal; longest ray about 3½ in head; caudal almost truncated, middle rays about 2 in head; anal origin under second dorsal spine, length of base 4 in head; first spine about 2⅖ in second; second 2⅖ in head; third shorter than second, about

3⅙ in head; longest ray equals longest dorsal spine; pectoral reaching vent, rays all simple, longest 3½ in length of body; ventral origin under base of pectoral, reaching vent, 4 in length of body. Color (in fresh specimen) uniform rosy, intermingled with pearly white; light areas most conspicuous on fins; anterior part of anal more intensely colored than any other part of fish; cephalic tentacles pale, the supraocular pair with a little band of rose a little below middle; pupil intense blue; iris golden above and below, overlaid with rosy, greenish golden anteriorly and posteriorly; belly and throat pearly white; the light areas on caudal simulate bands. Total length 4⅖ inches; to base of caudal, 3½ inches. A single, small individual, off Yucatan, in 130 fathoms. (Goode and Bean.) (*μακρός*, large; *λεπίς*, scale.)

Pontinus macrolepis, GOODE & BEAN, Oceanic Ichthyology, 257, fig. 247, 1896, N. lat. 20° 59′ 30″, W. lon. 86° 23′ 45″, at Albatross Station 2354, off Yucatan, in 130 fathoms. (Type, No. 39324.)

2249. PONTINUS CASTOR, Poey.

Head 2½ in total length; depth equal to distance from tip of snout to limb of preopercle, 4 in total length. D. XII, 10; A. III, 5; P. 17. Eye 5½ in head; snout prolonged in front of orbit; mouth very large; maxillary reaching ⅔ across eye; interorbital space very narrow; no pit at occiput; 3 pores on each side along lower jaw. Teeth as in others of the group, as also opercular spines, which are not striated; preopercle with a rather strong spine on its border which has another smaller one at its base; below this 2 blunter spines; first suborbital with a flat spine above and 2 others on its inferior border; none on its crests; 1 short backwardly directed spine on the second suborbital and 2 on the third; nasal spines present; preocular spines very sharp; supraocular, postocular, and tympanic spines present, in a straight line, joining the parietal and nuchal spines; a spine on the mastoid, another, sometimes 2, on the suprascapular; postfrontal with 2 small spines. Spinous dorsal low; last dorsal spine twice as long as the one before it; second anal spine medium; pectoral pointed, its seventh ray longest, the others decreasing rapidly; all simple, articulated. Lateral line plain, a tube on each scale; scales of back and belly of same form as those of sides, the latter larger, none on head, first suborbital, maxillary, interopercle, nor on limb of preopercle. Flaps not branched; supraorbital tentacle long, 5 in total length, the others very short; 1 on ethmoid, 1 on prefrontal, 1 on parietal, many on lateral line and belly. Body carmine red without marblings; fins with alternations of red and orange; iris red with small yellow circle; supraocular tentacles and last rays of pectoral annulated with brown. Length 9 inches. Havana; very rare in deep water. (Poey.) One specimen, collected by Poey and agreeing with his description, examined by us, in the U. S. National Museum. (*Castor*, twin brother of *Pollux*, in Mythology.)

Pontinus castor, POEY, Memorias, II, 173, 1860, Havana. (Coll. Poey.)
Scorpæna castor, MEEK & NEWLAND, Proc. Ac. Nat. Sci. Phila. 1885, 397, 402

2250. PONTINUS POLLUX,* Poey.

Very closely related to *Pontinus castor* in form and color, distinguished principally by its skeleton. D. XII, 10; A. III, 5; P. 17. Body higher than in *Pontinus castor*, head smaller; eye larger, 11 in total length, 4 in head; maxillary reaching anterior third of orbit; interorbital space only ⅓ of ocular diameter; occiput no more depressed than in *Pontinus castor*. First suborbital with 2 quite strong spines on its inferior border, and 1 on its crest; a double spine on second suborbital, 2 on third, in a line with the double anterior preopercular spine, below the latter 3 others; the other spines as in *Pontinus castor*. The long bony suprascapular tentacle more slender; a small preorbital tentacle; others present on the points of some of the dorsal spines; the rest difficult to distinguish. Pectoral rounded; spinous dorsal high. General color carmine red, with vertical rosy bands; these 2 colors alternating on the fins; iris vermilion; peritoneum silvery. Length 9⅗ inches. Havana, very rare (Poey); not seen by us. (*Pollux*, one of the Gemini or twins.)

Pontinus pollux, POEY, Memorias, II, 174, 1860, Havana. (Coll. Poey.)

2251. PONTINUS RATHBUNI, Goode & Bean.

Head about 2⅓; depth about 2½; eye and snout equal, 4 in head. D. XII, 10; A. III, 5; P. 17. Greatest width of head equals middle caudal rays. Interorbital space not very deeply concave, about 2⅗ in eye, about 10½ in head. Maxilla nearly reaching posterior margin of eye, about 2¼ in head. Mandible reaching beyond eye, equal to postorbital part of head, twice as long as eye. Teeth in villiform bands on jaws, vomer, and palatines; a naked space at symphysis of intermaxillaries. A pair of recurved spines on preorbital, 4 on suborbital carina; 4 on preopercle, the uppermost with a smaller supplementary spine at its base, the first and third largest; a pair of compressed flat spines on opercle; nasal, preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present; single posterior spine on each side and 2 humeral spines. Two gill rakers and 5 rudiments above the angle, and 8 rakers and 5 rudiments on the anterior limb, the longest about 6 in eye, slightly expanded at the tips. Pseudobranchiæ well developed. A very short and slender preocular and a large supraoccipital (supraocular?) filament, the latter about 1½ in eye, expanding at top into a semileaf-like tip; a small, slender filament between parietals and nuchal spines, a combined filament behind the lower preorbital spine; anterior nostril tubular, with 2 or 3 small filaments. Interorbital space with few scales; top of snout fully scaled; head entirely scaly above. Distance of spinous dorsal from tip of snout equals length of base of spinous dorsal, 2⅔ in body length; first spine 2 in second; third longest, 2⅙ in head, equal to upper jaw, twice as long as penultimate spine; last spine equals eye, 4 in head; base of soft dorsal 4, and longest rays 6 in body length. Caudal nearly truncate, middle rays 4¼ in body length; first anal spine about 2½ in second, the second longer than third; longest ray equals second spine; pectoral reaching slightly beyond vent, the rays all simple, the tenth longest, 4 in length of body; ventral reaching vent, its spine 3 in head. General color light orange yellow (in life probably roseate); 6 dark blotches on upper surface, first on nape, second at beginning of spinous dorsal, third under fourth dorsal spine, fourth beginning under seventh spine, fifth at origin and sixth near end of soft dorsal, the largest about ⅔ eye; soft dorsal with numerous roundish dark blotches on the skin covering the rays; caudal marked like soft dorsal; other fins pale. Length 4⅕ inches. Closely related to *Pontinus canariensis*, but distinguished by shorter pectorals, longer second anal spine, more advanced position of anal fin, suborbital crest, more advanced position of pectoral, whose base is almost hidden under branchiostegal membrane, etc. Off Cape Hatteras, North Carolina, in 80 fathoms. (Goode & Bean.) ("Named for Mr. Richard Rathbun, chief of the Division of Scientific Inquiry in the United States Fish Commission, in recognition of his important contributions to marine zoology.")

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* Poey states that he neglected to take notes on the generic characters founded upon the scales of the head and the simple rays of the pectoral in *Pontinus pollux*, but the species is so nearly related to *Pontinus castor* that he believes it belongs to the same genus.

Pontinus rathbuni, GOODE & BEAN, Oceanic Ichthyology, 255, fig. 245, 1896, off Cape Hatteras, N. lat. 35° 39′, W. long. 74° 52′, in 80 fathoms, Albatross Station 2298. (Type, No. 39325.)

2252. PONTINUS LONGISPINIS, Goode & Bean.

Head about 2½; depth 3⅐; least depth of caudal peduncle 4 in head. D. XII, 10; A. III, 5; P. 16; rows of scales 7–49–13; pores of lateral line 25. Greatest width of head about 2 in its length; interorbital space 7 in head, 2 in eye. Eye 3⅓ in head, equal to snout. Maxilla reaching middle of eye, 2⅙ in head. Mandible extending a little farther back, about 2 in head. Teeth in jaws in villiform bands; a slight interspace at symphysis, separating the 2 enlarged, club-shaped ends of the intermaxillaries; vomerine teeth in a very narrow triangular band; palatine bands very narrow. Nasal, preocular, supraocular, postocular, tympanic, parietal, and nuchal spines present; the supra and post ocular and tympanic small; a postorbital spine behind orbit, 2 on shoulder; a pair of spines on front of preorbital, 3 on suborbital ridge, 4 on preopercle, of which the one at the middle of the border is the largest; 2 on opercle. Gill rakers stout, rather short, 12 developed on anterior arch, 9 of them on anterior limb, besides the rudiments. Pseudobranchiæ well developed. No filaments about head. Cheeks, opercles, nape, and top of snout scaly; sides of snout and maxillaries naked. Anterior nostril tubular, distance from eye ⅓ of diameter of eye. Origin of spinous dorsal a little in front of base of pectoral, distance from tip of snout twice length of maxilla; first spine about 1½ in second, second about 2 in third, third 2 in head, the eleventh about 1⅓ in twelfth, longest ray 2⅔ in head; caudal very slightly emarginate, middle rays about 4 in body length; origin of anal under first ray of soft dorsal, its base about 3 in head, second spine longest, the first 3¼ in second, 2½ in third; longest ray a little shorter than longest spine; pectoral reaching beyond vent, almost to end of spinous dorsal, its origin below second and third dorsal spines, rays all small; ventral under pectoral, reaching vent, about 2 in head, its spine equal to maxilla. Vent under ninth spine of dorsal. Color (of alcoholic specimen) light orange; caudal with a few small dusky blotches; the other fins pale. Not so deep-bodied as *Pontinus kuhlii*, but its gill rakers, dorsal fin, and the ridges of head and of the scales are similar. Length 5 inches. Gulf of Mexico, off coast of western Florida, in moderately deep water. (Goode & Bean.) (*longispinis; longus*, long; *spina*, spine.)

Pontinus longispinis, GOODE & BEAN, Oceanic Ichthyology, 258, fig. 246, 1896, Gulf of Mexico, at Albatross Station 2402, 28° 36′ N., 85° 33′ 30″ W., in 111 fathoms. (Type, No. 39323.)

2253. PONTINUS SIERRA (Gilbert).

Head 2⅕; depth 3. D. XII, 10; A. III, 5; P. 18; lateral line 25 (tubes). Body of moderate depth; the snout sharp; caudal peduncle slender, wedge-shaped, least depth less than ⅕ head. Eye large, equaling snout, 4 in head. Mouth large, the lower jaw wholly included, the dentigerous portion of premaxillaries shutting outside of mandible, with a deep notch anteriorly, which receives tip of mandible. A strong symphyseal knob. Maxillary in adults, about reaching vertical from posterior border of orbit, nearly ½ length of head. Teeth in broad bands on jaws, vomer, and palatines. Interorbital space narrow, concave, with a pair of low ridges much diverging behind, its width 2⅓ in orbit. Head very rough, the spines compressed, knife-like, disposed in 6 well-defined series, the upper containing the nasal, the conspicuously projecting preocular, the supraocular, postocular, tympanic, occipital, and nuchal spines; paroccipital ridge containing a single spine immediately behind orbit, and 1 at its posterior extremity; the bridge across cheek very strong, its ridge continued forward onto preorbital bone and containing 4 very strong spines; margin of preorbital with 2 diverging spines; upper spine of preopercle very strong, in line with suborbital ridge, with a smaller spine at base; 3 other preopercular spines below this, directed downward and backward, the lower nearly obsolete in adults. No pit on occiput or below front of eye. Gill rakers short and broad, about as high as wide, the longest about ½ diameter of pupil, 7 in number on anterior limb of arch. Dorsal spines weak, very low, the longest equaling diameter of orbit, the eleventh ½ this length; soft dorsal short and high, its longest ray 2½ in head; caudal truncate, its length equaling length of snout and eye; anal spines not very strong, the second slightly longer and stronger than the third, its length equaling length of snout, 1½ in soft rays; ventrals not reaching vent; pectorals with narrow nonprocumbent base, their width about equaling eye, the rays all simple. Scales large, thin, everywhere ctenoid, covering breast, cheeks, opercles, top of head, and a part of snout; wanting on maxillaries and mandibles; head with simple slender filaments, usually 1 to each spine; each scale of sides with a fringe of minute filaments around edge. Color, light red, with irregular dark greenish olive markings on upper half of sides; a blotch of same color below eye, 1 above opercular spine, and a few rounded spots on soft dorsal, more numerous on caudal; lower side of head white; buccal and gill cavities and peritoninum bright white. Length 10 inches. Gulf of California, in moderately deep water. (Gilbert.) (*sierra*, a saw, in Spanish.)

Scorpæna sierra, GILBERT, Proc. U. S. Nat. Mus. 1890, 82, Gulf of California at Albatross Stations 2996 and 3011, in 112 and 71 fathoms, N. lat. 24° 30′ 15″, W. long. 110° 29′, and N. lat. 28° 7′, W. long. 111° 39′ 45″.

695. SETARCHES, Johnson.

Setarches, JOHNSON, Proc. Zool. Soc. Lond. 1862, 177 (*guntheri*).
Bathysebastes, STEINDACHNER & DÖDERLEIN, Denschr. Akad. Wiss. Wien 1884, 207 (*albescens*).

Head and body compressed; head scaleless above, its bones cavernous, flat between the eyes; only 1 pair of spines at occiput; no transverse groove at occiput, only small spines or none above orbit; opercle and preopercle strongly armed with straight, long spines. Eye moderate, near, but not touching, profile. Mouth terminal, broad, somewhat oblique; maxillary extending to posterior edge of eye, much expanded behind. Lower jaw somewhat projecting, the small symphyseal knob received in rostral notch. Villiform teeth on jaws, vomer, and palatines. Preorbital with 2 or 3 spines. Opercle scaly. Scales cycloid, moderate. Lateral line a broad, scaleless groove with skinny (about 27 to 30) tubes. No laciniæ. Dorsal deeply notched, with 12 spines, its origin in front of pectoral; soft dorsal shorter, the rays fewer than the spines. Anal inserted under end of dorsal, its spines strong, graduated. Pectoral broad and bony, with 20 or more rays, of which a considerable number of median ones are branched. Branchiostegals 6 or 7. Pyloric appendages few. Deep water. (Goode & Bean.) (Etymology not obvious.)

2254. SETARCHES PARMATUS, Goode.

Head $2\frac{1}{3}$; depth about $2\frac{1}{2}$. D. XII, 10; A. III, 5 or 6; about 30 tubes in lateral line. Body short, somewhat compressed; head somewhat compressed. Interorbital area equal to eye. Eye somewhat below profile. Ridges on top of head low and inconspicuous; 2 extending to occiput, terminating in low flat spines; 2 short ones over posterior margin of orbit, ending in spines. Snout as long as orbit. Mouth wide, somewhat oblique, maxillary reaching nearly to posterior margin of orbit, its extremity expanded. Lower jaw scarcely projecting, without prominent knob at symphysis. Sides of head lightly armed; 4 slender elongate spines on preopercle; spines on opercle small and inconspicuous; 2 slender spines on preorbital, the anterior one touching opening of mouth; edge of suborbital broadly scalloped with 2 points projecting downward opposite anterior and posterior margin of orbit. Dorsal insertion in advance of the pectoral, first spine more than $\frac{1}{2}$ second, equal to ninth; second equal to seventh; third and fourth equal, a little longer than maxillary, the fin deeply notched; anal inserted under posterior part of soft dorsal, last spine and longest ray equal, as long as soft dorsal; ventral base under second dorsal spine; tip not reaching vent; pectoral broad at base, elongate, some of the median rays apparently branched, the tip extending beyond origin of anal. Vent close to origin of anal. Scales small, cycloid, each with several concentric furrows; scales on opercle, preopercle, and subopercle; head otherwise scaleless. Lateral line broad, scaleless, with skinny tubes, practically parallel with dorsal outline. (Goode & Bean.) Gulf Stream off coasts of Rhode Island and North Carolina and off western Florida; also off Barbados in 93 to 209 fathoms. (*parmatus*, shielded, from the large scales.)

Setarches parmatus, GOODE, Proc. U. S. Nat. Mus. 1880, 480, young specimen, from the "Lopholatilus grounds" in the Gulf Stream south of Rhode Island, at Fish Hawk Station 876, lat. 39° 57′ N., long. 70° 56′ W., in 120 fathoms (Type, No. 28084); GOODE & BEAN, Bull. Mus. Comp. Zool., X, No. 5, 213, 1883; JORDAN & GILBERT, Synopsis, 682, 1883; GÜNTHER, Challenger Report, XXII, 19 1887; GOODE & BEAN, Oceanic Ichthyology, 264, fig. 249, 1896.

Family CLXXVII. ANOPLOPOMATIDÆ.

(THE SKIL-FISHES.)

This family is closely allied to the *Hexagrammidæ*, differing chiefly in the normal development of the nostrils, which are formed as in the *Scorpænidæ* and as in fishes generally. The two known genera differ widely from each other. Both are found in the North Pacific.

ANOPLOPOMATINÆ:
- *a.* Dorsal fins widely separated; anal fin with 3 spines. ANOPLOPOMA, 696.

ERILEPIDINÆ:
- *aa.* Dorsal fin continuous, deeply notched; anal without distinct spines. ERILEPIS, 697.

696. ANOPLOPOMA, Ayres.

Anoplopoma, AYRES, Proc. Cal. Ac. Nat. Sci. 1859, 27 (*merlangus* = *fimbria*).
Scombrocottus, PETERS, Berliner Monatsber. 1872, 569 (*salmoneus* = *fimbria*).

Body elongate, little compressed, tapering into a very slender caudal peduncle; head rather long, the snout somewhat tapering; mouth terminal, moderate, the lower jaw included; maxillary very narrow, slipping almost entirely under the preorbital; teeth moderate, cardiform, those in the lower jaw in a single series laterally, and in a narrow band in front; upper jaw, vomer, and palatines each with a band of similar teeth; head entirely scaly; no supraorbital flap; preopercle unarmed, its membranaceous edge crenulate; gill membranes joined to the isthmus; body entirely covered with minute ctenoid scales; lateral line single; dorsals short, well separated, the first of slender, flexible spines; second dorsal shorter, similar to the anal, which is preceded by 3 weak spines; ventrals but little behind pectorals; caudal fin forked; peritoneum black; pyloric cæca about 2, long and slender; gill rakers slender, few, not very short; nostrils normal, the posterior well developed. Two species known; large fishes, valued as food. (ἄνοπλος, unarmed; πῶμα, operculum.)

2255. ANOPLOPOMA FIMBRIA (Pallas).

(BESHOW; COAL-FISH; SKIL.)

Head $3\frac{1}{2}$; depth 6. D. XXI-17; A. III, 15; lateral line 190; eye 7 in head; snout 3; fourth dorsal spine $3\frac{1}{8}$; longest dorsal ray $3\frac{1}{4}$; longest anal ray $3\frac{1}{2}$; pectoral $1\frac{9}{10}$; ventrals $2\frac{1}{2}$; upper caudal lobe $1\frac{9}{10}$. Body elongate, little compressed, tapering into a very slender subcylindrical, caudal peduncle; head rather large, conic. Mouth terminal, moderate, the lower jaw included; maxillary narrow, reaching to below front of pupil; teeth cardiform, in moderate bands on jaws, vomer, and palatines; interorbital over twice as broad as eye, very slightly convex; gill rakers moderate, slender, 6+17; head entirely scaly; fins naked. Dorsals and anal highest in front; origin of spinous dorsal behind base of pectorals, midway between tip of snout and first ray of second dorsal, the fourth spine highest, the spines gradually decreasing in length posteriorly; soft dorsal separated from spinous by a distance equal to length of pectoral; anal similar to soft dorsal; pectoral sharply rounded behind, reaching slightly past tip of anal, not halfway to vent; ventrals rather short, inserted slightly behind base of pectoral, not reaching nearly to tips of pectorals; caudal forked. Color slaty black or grayish, somewhat reticulated; white below, the young rather pale; adult nearly black; ventrals and anal colorless, other fins dusky; caudal edged with pale; lining of opercle black. Usual length 18 inches, but sometimes much larger. Here described from a specimen 11 inches in length from Monterey. Monterey to Unalaska; rather common, especially northward. A very singular and interesting fish. It is rarely used for food southward, being rather dry and tasteless. About the Straits of Fuca it becomes very fat and is highly appreciated. (*fimbria*, fringe.)

Gadus fimbria, PALLAS, Zoogr. Rosso-Asiat., III, 200, 1811, no exact locality given; probably Aleutian Islands.
Anoplopoma merlangus, AYRES, Proc. Cal. Ac. Sci. 1859, 27, San Francisco market.
Scombrocottus salmoneus, PETERS, Berlin. Monatsber. 1872, 569, Vancouver Island.
Anoplopoma fimbria, JORDAN & GILBERT, Synopsis, 650, 1883.

697. ERILEPIS, Gill.

Erilepis, GILL, Science, Jan. 26, 1894, 54 (*zonifer*).
Myriolepis, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 248 (*zonifer*); name preoccupied by *Myriolepis*, EGERTON, 1864, a genus of fossil fishes.

Body oblong, somewhat compressed. Head heavy. Mouth moderate, the lower jaw slightly projecting; both jaws with bands of slender, sharp teeth, the front teeth slightly enlarged; similar teeth on vomer and palatines; preopercle entire; no dermal flaps. Nostrils 2 on each side. Gill rakers short; gill membranes very narrowly joined to the isthmus. Scales small, ctenoid, everywhere covering the head and body and the soft parts of most of the fins. Lateral line single. Dorsal fin deeply emarginate, the spines about 15 in number. Anal rather short, without distinct spines. (ἔρι, an intensive particle; λεπίς, scale.)

2256. ERILEPIS ZONIFER (Lockington).

Head 4 in total length with caudal; depth $3\frac{2}{3}$. D. XIV–I, 15; A. II, 11; lateral line 130. Head everywhere densely scaly, the only naked areas on the head being the lips and the folds of the gill membranes. Scales on body largest posteriorly, small on head and chest. Vertical fins, except the spinous dorsal, covered nearly to the tips of the rays with small scales; external surfaces of paired fins similarly scaly; spinous dorsal with a few scales. Pectorals broad, lanceolate, not reaching the vent; fourth dorsal spine longest, the others diminishing regularly to the twelfth. Eyes lateral, shorter than snout; interorbital space broad, slightly convex; maxillary nearly reaching to below middle of pupil; teeth slender, sharp, recurved, in several rows on front of jaws, in a single row at sides; vomer and palatines with teeth; gill rakers short; gill membranes united, attached to isthmus except at posterior margin; interorbital slightly convex; pectoral reaching to below base of eleventh dorsal spine; ventrals inserted a little behind pectorals. Black above, whitish below, with 4 broad black bars on the sides, the first over the pectorals, the second anterior to the vent, almost encircling the body, the third near the base of the anal, and the fourth encircling the caudal peduncle; a black bar at base of caudal and 2 across the fin; other fins blotched and banded with light and dark; ctenoid tips of the scales white. Length a foot. Monterey Bay, Calfornia; 1 specimen known, the above account taken from the type. (*zona*, zone; *fero*, I bear.)

Myriolepis zonifer, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 248, Monterey (Coll. W. N. Lockington); JORDAN & GILBERT, Synopsis, 649, 1883.

Family CLXXVIII. HEXAGRAMMIDÆ.

(THE GREENLINGS.)

Body elongate, covered with small scales, which are ctenoid or cycloid; head conical, scaly, the cranium without spinous ridges above; preopercle usually more or less armed, sometimes with entire edges; third suborbital developed as a bony stay articulating with the preopercle; mouth large, with acute teeth in the jaws, and usually on vomer or palatines; nostril single on each side, the posterior opening reduced to a minute pore; gills 4, a long slit behind the fourth; gill membranes separate or united, usually free from the isthmus; branchiostegals 6 or 7; pseudobranchiæ well developed. Dorsal fin continuous or divided, the anterior half of many slender spines; anal fin long, with or without spines; ventrals I, 5, inserted more or less behind the pectorals; pectorals broad, usually with procurrent base, the lower rays simple, more or less thickened; lateral line present, sometimes several series of pores developed; vertebræ numerous; pyloric cæca. Carnivorous fishes, mostly of large size, living in kelp and about rocks in the North Pacific; some of them highly valued as food. Genera 6, 2 of them found only in Japan. The 4 subfamilies are each very strongly marked, and each might without violence be regarded as type of a distinct family. (*Triglidæ Heterolepidina*, Günther, Cat., II, 90 to 95.)

a. Dorsal fins contiguous or connected.
  b. Anal fin very long, its rays 20 or more.
    c. Anal fin without spines.
    HEXAGRAMMINÆ:
      d. Gill membranes broadly united; mouth moderate, the jaws with an outer series of stronger teeth, but no canines.
        e. Lateral lines* 4 or more on each side.
          f. Dorsal fin continuous, or slightly emarginate. PLEUROGRAMMUS, 698.
          ff. Dorsal fin with the spines separated from the soft rays by a deep notch. HEXAGRAMMOS, 699.
    OPHIODONTINÆ:
      dd. Gill membranes not connected; mouth large, the jaws armed with strong canines; lateral line single on each side; scales cycloid; preopercle armed. OPHIODON, 700.
    cc. Anal fin with 3 stout spines.
    ZANIOLEPIDINÆ:
      g. Gill membranes scarcely united; spinous dorsal greatly elevated in front; scales very rough. ZANIOLEPIS, 701.
    OXYLEBIINÆ:
      gg. Gill membranes broadly united; dorsal spines low, stiff; head pointed. OXYLEBIUS, 702.

698. PLEUROGRAMMUS, Gill.

(ATKA FISHES.)

Pleurogrammus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 166 (*monopterygius*).

This genus differs from *Hexagrammos* mainly in the character of the dorsal fins, the high spines being continuous with the soft rays. Scales ctenoid. Lateral lines 5 on each side. The single species known is highly valued as a food-fish, its flesh being rich and tender. (πλεῦρον, side; γραμμή, line.)

2257. PLEUROGRAMMUS MONOPTERYGIUS (Pallas).

(ATKA-FISH.) †

Head 4 in length of body; depth 4; D. XXI, 25; A. 24; lateral line 210, pores 143; eye 5 in head; maxillary 2⅘; snout 3½; interorbital 3⅓; highest dorsal spine 1⅔; highest anal ray 2½; pectorals 1⅕; ventrals 1¾; caudal lobe 1½; gill rakers 6 + 22. Body rather stout, little compressed; head not large, the profile rather steep; mouth moderate, below the axis; maxillary extending to below anterior edge of pupil; jaws subequal, the teeth cardiform, in rather broad bands on front of jaws, the outer series slightly enlarged, a single row on sides; teeth on vomer and a few asperites on palatines; interorbital wide and evenly convex. Scales small, ctenoid; top of head to just in front of nostrils scaled; cheeks and opercles with scales; tip of snout, preorbital, suborbital stay, maxillaries, mandible, and a space around edge of preopercle naked; scales running up the base of pectorals and caudal, fins otherwise naked. Five lateral lines; the first following the curve of the back, running from nape to upper edge of caudal fin, joining its fellow of the opposite side in front of dorsal but not concontinued forward, its distance below dorsal fin anteriorly equal to ½ eye; the second running from upper part of gill opening to middle of caudal fin; the third running from a point on side, on level with lower edge of pectoral and between tips of pectoral and ventral, to the beginning of posterior fourth of anal base; the fourth from gill opening running just above base of ventrals to a short distance beyond their tips; the fifth running above base of anal to lower part of caudal, anteriorly undulating on belly and joining its fellow of the opposite side, just behind base of ventrals, and continuing forward simply between ventrals to throat. Origin of spinous dorsal above upper end of gill slit continuous with soft dorsal, no notch between them; first anal ray a little nearer base of caudal than posterior orbital rim, coterminous with soft dorsal; pectorals broad and short, evenly rounded behind, reaching to below the base of the fourteenth dorsal spine; ventrals inserted behind pectorals a distance equal to length of snout, their tips reaching just past tips of pectorals, or ¾ distance to vent; caudal forked, the lobes about equal. Ground color in life, of male 18 inches long, pale dirty yellowish; head mottled with darker; anterior part of body with a few large black blotches; side crossed by 5 black cross bars, the first, which is narrower and less distinct than the others, extending from the twelfth and thirteenth dorsal spines downward to below middle of pectoral fin; the second, ¾ inch wide, extends from the eighteenth to twentieth dorsal spines downward, its lower end lying under the pectoral, its posterior edge flush with the tip of that fin; the third lies about ½ inch farther back and is about ½ inch wide, its upper part indistinct and it does not extend so low on belly as the second; fourth bar very broad (1½ to 2 inches), broken and irregular at top but blackest and widest at the bottom, where it stretches from the sixth to the sixteenth anal ray; the fifth and last bar (1¼ inches wide) lies between the last 5 dorsal and the last 9 anal rays; above, this bar extends over the caudal peduncle and back almost to the caudal fin; all these black bars are continued upon the dorsal fin, the fourth and fifth most plainly; rest of dorsal fin pale yellowish, the margin with a very narrow black border throughout its entire length, darkest posteriorly; pectoral reddish at base and above, black below and at tip; ventrals black, reddish at base; anal black throughout; caudal reddish; lower parts white. Another specimen of same size had the following colors: Ground color pale chrome yellow, area above second lateral line somewhat dusky; bright chrome yellow below second lateral line; vertical bars not so dark as in the other specimen described; dorsal fin uniform light orange, with a very narrow black border beginning on the membrane between the fifth and sixth spines and continuing to posterior end of fin; pectoral clouded orange or amber above, black below tenth ray, paler at base; axil pale yellow; anal black, a little lemon at base in front and between fifteenth and eighteenth rays; ventrals black, yellow at base; caudal light orange; branchiostegal membranes white and pale lemon, a little dusky on outer parts. Besides these 2 patterns of coloration, of which the first is the more common, some individuals are dirty gray with the bars not well defined. North Pacific; abundant about certain of the Aleutian Islands, particularly Atka and Attu, rather rare at Unalaska and about the Pribilof Islands, but erratic in its movements, ranging east to Belkofski; found in the kelp in 3 to 40 fathoms in spring and early summer, when it can be readily caught by jigging. It reaches a length of 18 inches or more and a weight of 3 to 4 pounds. A most beautiful fish of excellent food qualities, especially excellent when salted; destined to become of commercial importance. Here described from numerous specimens taken at Attu Island, May 28, 1892 (Coll. Evermann). (*μόνος*, one; *πτερύγιον*, fin.)

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* Lateral line single in the Japanese genus, *Agrammus*.

† Commercially known as "Atka mackerel." It is, however, not a mackerel, nor has it any resemblance to one.

Labrax monopterygius, Pallas, Mém. Acad. Sci. Petersb., II, 391, pl. 23, fig. 1, 1810, Unalaska; Pallas, Zoogr. Rosso-Asiat., III, 281, 1811.

Chirus monopterygius, Günther, Cat., II, 92, 1860.

Hexagrammus monopterygius, Jordan & Gilbert, Synopsis, 642, 1883.

Pleurogrammus monopterygius, Turner, Contr. Nat. Hist. Alaska, II, 96, 1886.

699. HEXAGRAMMOS (Steller) Tilesius.

(Rock Trout; Greenlings.)

Dodecagrammos, Steller, in Krasheninnikof, Reise in Kamchatka, 175, 1750 (nonbinomial).

Hexagrammos, Steller MS.

Hexagrammos, Tilesius, Act. Acad. Petrop., II, 335, 1809 (*asper*).

Labrax (Steller MS.) Pallas, Mém. Acad. Petersb., II, 382, 1810 (*lagocephalus*).

Lebius (Steller MS.) Pallas, Zoographia Rosso-Asiat., III, 279, 1811 (*superciliosus*).

Chirus (Steller MS.) Pallas, Zoographia Rosso-Asiat., III, 279, 1811 (*superciliosus*).

Chirus, Cuvier, Règne Anim., Ed. II, vol. 2, 249, 1829 (*superciliosus*).

Chiropsis, Girard, U. S. Pac. R. R. Surv., X, Fishes, 42, 1858 (*constellatus*).

Octogrammus, Bleeker, Versl. Ak. Amat., VI, 1370, 1874 (*octogrammus*).

Grammatopleurus, Gill, Proc. Ac. Nat. Sci. Phil. 1861, 166 (*lagocephalus*).

Acantholebius, Gill, Proc. Ac. Nat. Sci. Phil. 1861, 166 (*nebulosus;* specimen with the soft dorsal injured, the number of spines apparently increased).

Body oblong, somewhat compressed. Head subconical, blunt in profile. Mouth rather small, horizontal; jaws with bands of moderate sized, conical teeth, the outer row enlarged; teeth on vomer, and usually but not always, a small patch on the palatines; preopercle unarmed; a fringed supraorbital cirrus, large or small; gill membranes broadly connected, free from the isthmus; gill rakers short, tubercle-like. Scales small, mostly ctenoid, sometimes partly or wholly cycloid; head more or less scaly, without spines; nostril simple, round, with a pore behind it. Lateral lines usually 5 on each side. Dorsal fin long, with a deep emargination between the spines and the soft rays; dorsal spines slender, 19 to 22 in number; anal fin elongate, with a single rudimentary spine; rays of pectorals and anal exserted and almost simple; pectoral rounded, with broad, procurrent base, the rays thick; ventrals well developed, placed at a considerable distance behind the root of the pectorals; caudal subtruncate. Branchiostegals 6. Pyloric cæca numerous (about

13). No air bladder. Species of rather large size and bright coloration; abundant in the North Pacific on both shores, extending southward from Bering Sea. (ἕξ, six; *γραμμή*, line.)

- *a.* Cheeks and opercles fully invested with cycloid scales, including area overlying suborbital stay. Two pairs of cutaneous flaps on head. DECAGRAMMUS, 2258.
- *aa.* Cheeks not fully scaled, at least the area over suborbital stay naked. No flap on occiput.
  - *b.* Fourth line of pores forking in advance of base of ventrals, the lower branch running to base of anal fin. OCTOGRAMMUS, 2259.
  - *bb.* Fourth line of pores simple, passing close to ventral fin.
    - *c.* Cheeks and opercles largely naked, a patch of scales on upper portions of cheek and opercles, and a small patch sometimes present on middle of cheek. STELLERI, 2260.
    - *cc.* Cheeks and opercles largely scaled, the subocular ring, the region overlying the suborbital stay, and the interopercle alone naked.
      - *d.* Supraorbital flap long and slender, densely fringed, its length about equal to the vertical diameter of orbit; scales largely smooth posteriorly in the adult. SUPERCILIOSUS, 2261.
      - *dd.* Supraorbital flap small, little if at all longer than diameter of pupil.
        - *e.* Caudal very broad, the posterior margin convex even in the closed fin; scales smooth in adult. LAGOCEPHALUS, 2262.
        - *ee.* Caudal narrower than in *H. lagocephalus*, the posterior edge emarginate when fin is closed. Scales smaller than in any other species, those on sides of head and breast minute, nearly uniform, less than ¼ the size of those on sides of body; 11 or 12 scales in an oblique series between second and third lines; scales on mid-ventral region breast, prepectoral area, and sides of head, smooth, all others strongly ctenoid throughout life; first lateral line extending beyond middle of second dorsal; fourth line short, not reaching tips of ventrals; fifth line forking behind middle of ventrals. Eye large, 4½ in head. Supraorbital tentacle very small. Anterior teeth in jaws much enlarged, canine-like. Palatines toothless. Fin membranes thin. Dorsal low, less deeply notched than usual. Color brown, blotched and barred with darker, many of the scales each with a silvery spot; no radiating streaks about eye; black blotches on dorsal fin corresponding to a similar number on back along base of dorsal. D. XX, 23; A. 21. Size small. Known only from Japan. H. OTAKII.*

2258. HEXAGRAMMOS DECAGRAMMUS (Pallas).

(ROCK TROUT; BOREGAT; BODIERON.)

Head 4⅕; depth 4. D. XXI, 24; A. I, 23; scales 112. Body elevated at the shoulders, descending rather steeply at the nape; maxillary not reaching middle of eye; a very few teeth on front of palatines; supraocular flap smaller than in other species, shorter than pupil. Cheeks and opercles entirely scaled; scales on the body all strongly ctenoid. Snout, jaws, preorbital, interopercle, and adjacent portion of preopercle scaleless; breast and prepectoral area with cycloid scales, much less than ½ the size of those on sides; scales elsewhere ctenoid; 10 or 11 scales in an oblique series between lateral line and the one above it; uppermost lateral line forking on the nape, the branches running to opposite the middle of the second dorsal; the second lateral line to upper edge of tail; the third to middle of tail; the unbranched fourth to a little beyond the middle of anal; the fifth to lower edge of tail; the fourth beginning near the lower edge of the pectorals and undulating opposite the ventrals, the lowermost on each side joining just in front of the vent, and proceeding on the median line to the middle of the breast. Pectorals and ventrals large; caudal slightly emarginate; membranes of soft dorsal and caudal densely scaled for more than ½ height of fin. Two pairs of cutaneous flaps on head, the usual supraocular pair, less than ½ diameter of pupil, and a much smaller occipital pair which is present in no other species; dorsal high, deeply notched; caudal emarginate when closed, slightly convex when widely spread. Adults brightly colored, the males with large sky-blue spots, the females with smaller red or orange spots. Young sometimes plain brown, with dark plain humeral spot. Males clear brownish olive of varying shade, often tinged with bluish or coppery and vaguely blotched, often with small blue spots; head and anterior part of body with rather large sky-blue spots, each surrounded by a rusty ring, these smaller and more numerous on the top of the head; lips with bluish spots; upper fins brown, mottled; ventrals and anal dusky bluish; pectorals dark, both rays and membranes crossed by sharply defined whitish reticulations, so that the fins appear to be profusely spotted with white. Females brownish, somewhat tinged with reddish, closely covered with round spots of a reddish brown; these spots usually quite small and uniform over the whole back and sides; dorsal fin spotted on the scaly part, the fins otherwise plain reddish or bluish, the ventrals usually dusky; pectorals light orange, without markings. Other females ("*maculoseriatus*") have the ground color slaty blue, with rows of round orange spots considerably larger than usual, and becoming vermiculations on the head; dorsal fin orange, clouded at base with blue; soft dorsal edged with bluish; pectorals plain orange; belly white. These vary into the ordinary type. Both types were found in abundance at Sitka. Length 18 inches. North Pacific; abundant from Point Concepcion to Kadiak Island, Alaska; especially about San Francisco, a common food-fish; the sexes very unlike, the females varying much in color; the males very uniform. (*δέκα*, ten; *γραμμή*, line.)

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* *Hexagrammus otakii*, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 800, Yokohama. (Coll. Keinosuke Otaki.)

Labrax decagrammus, PALLAS, Mém. Ac. Petersb., II, 386, pl. 22, fig. 2, female, 1810, St. Elias Bay (Coll. Joseph Billings); PALLAS, Zoogr. Rosso-Asiat., III, 278, 1811.

Chirus guttatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 132, female, San Francisco. (Types, Nos. 269, 270. Coll. Dr. Heermann, and Lieut. Trowbridge; No. 271, Astoria, Oregon. Coll. Lieut. Trowbridge).

Grystes lineatus, AYRES, Proc. Cal. Ac. Nat. Sci., I, 1854, 9, San Francisco. (Coll. W. O. Ayres.)

Chiropsis constellatus, GIRARD, U. S. Pac. R. R. Surv., X, Fish., 42, 1858, male, San Francisco. (Types, Nos. 263, 264, 265, U. S. Nat. Mus. Coll. Dr. Kennedy, Dr. Heermann, and Lieut. Trowbridge.)

Chirus maculoseriatus, LOCKINGTON, Proc. U. S. Nat. Mus., 1880, 55, San Francisco, female with large spots. (Coll. Lockington.)

Chiropsis guttatus, GIRARD, U. S. Pac. R. R. Surv., x, Fish., 44, 1858.
Chirus decagrammus, GÜNTHER, Cat., II, 92, 1860.
Chirus constellatus, GÜNTHER, Cat., II, 92, 1860.
Hexagrammus decagrammus, JORDAN & GILBERT, Synopsis, 645, 1883.

2259. HEXAGRAMMOS OCTOGRAMMUS (Pallas).

(ALASKA GREENFISH.)

D. XIX, 23; A. 24; P. 19. Body lanceolate; head conic, compressed; snout obtuse, the upper jaw the longer; eyes large; gill membrane notched; the vertex and opercles finely scaly; scales on body moderate, very rough as in *Hexagrammos stelleri*. Dorsal subcontinuous. Lateral lines 4, the first and second along the back parallel with the median lateral line from head; the first chain-like; the second conspicuous, disappearing near end of soft dorsal; the third from gill opening ending opposite the middle of caudal fin; the other from throat to caudal joining its fellow of the opposite side and running simple forward to throat. Body yellowish below, above and on dorsal with many dark spots; back subolivaceous; first dorsal reddish, second with dark spots; pectoral translucent; ventrals tipped with black. Found around Kamchatka in the Bay of Avatcha, and the port of St. Peter and Paul, and not less abundant around the Aleutian Islands; called *Terpugh* (file) on account of the roughness of its scales; called in Aleutian *Idgajak*. Collected by D. Merk. (Pallas.) Dr. Gilbert has the following notes on this species: "This species is closely related to *H. stelleri*, differing conspicuously in shape, color, and fin formulæ. *H. stelleri* is very slender in shape, tapering rapidly from below front of spinous dorsal backward to the very slender caudal peduncle. In *H. octogrammus* the depth is greater and diminishes very slowly backward, the body tapering gradually into a high compressed caudal peduncle. The vertical height of the latter equals distance from the tip of snout to the middle or beyond middle of eye in *H. octogrammus*, while the same measurement is less than length of snout in *H. stelleri*. In *H. octogrammus* the snout is shorter and more bluntly rounded, the eye is smaller, the mouth smaller, and the cheek shorter and wider. The squamation is also more complete, the cheek being entirely invested, except for the area immediately overlying the suborbital stay. (Gilbert.) The following notes are taken from specimens recently collected: Fourth line of pores forking in advance of base of ventrals, the lower branch running to base of anal fin, where it ends, the upper branch usually short, ending opposite middle of ventrals, rarely longer. Second line reaching middle of second dorsal. Scales very roughly ctenoid, except on breast, prepectoral region, and sides of head; 7 or 8 scales in an oblique series between median lateral line and the one above it. Lower line forked in front of middle of ventral fin. Caudal densely covered with comparatively large scales to behind middle of fin, the scales in single series except on middle rays. Supraorbital flap large, coarsely fringed, equaling or exceeding vertical diameter of eye. Eye very small, 5½ in head in adults. Caudal peduncle deep, its depth greater than length of snout; the caudal fin very broad, rounded behind, even when the fin is closed. Dorsals deeply notched. Adults usually deep brown, with blackish mottlings and more or less distinct traces of radiating streaks around the eye, and a round, dusky, humeral spot. Younger individuals are often lighter, resembling *H. stelleri,* with small silvery spots on sides, and reddish fins, often showing very conspicuously the 7 V-shaped or quadrate blackish blotches at base of dorsal fin, and 5 black radii diverging from eye. The anal fin is usually black in adults, but often shows oblique cross bands in the young. This species as now understood is found among the Aleutian Islands and westward to Kamchatka. It is abundant about Unalaska and was obtained by Dr. Stejneger at Petropaulski. The commonest shore form[*] of the genus in Bering Sea. Specimens were taken at Unalaska, Petropaulski, Robben Island, and Iturup Island. (*ὀκτώ,* eight; *γραμμή,* line.)

Labrax octogrammus. PALLAS, Zoogr. Rosso-Asiat., III, 283, 1811, Kamchatka, Petropaulski and Avatcha Bay. (Coll. Merk.)

Chirus ordinatus,[†] COPE, Proc. Amer. Philos. Soc. Phila. 1873, 28, Unalaska. (Coll. Prof. Geo. Davidson).

Octogrammus pallasi, BLEEKER, Versl. Ak. Amst., VI, 1370; after PALLAS.

Chirus octogrammus, GÜNTHER, Cat., II, 92, 1860.

Hexagrammus ordinatus, JORDAN & GILBERT, Synopsis, 642, 1883.

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[*] This species has been currently known as *H. ordinatus.* We make the identification with *octogrammus* for the following reasons: (*a*) It occurs abundantly at the type locality for *octogrammus,* and so closely resembles *H. asper* as to often require close scrutiny to separate the two species. According to Pallas, *octogrammus* and *asper* are not considered distinct by the natives, and were even confounded by Steller. (*b*) *Octogrammus* is said to be abundant throughout the Kamchatkan region and the Aleutian Islands. Yet if not *ordinatus* it is not to be identified with any known species, and must have escaped the notice of all recent collectors. (*c*) *Octogrammus* is described as having 19 dorsal spines and 24 anal rays. This is the usual formula for *ordinatus,* while no other species is known to have as few as 19 spines. The only important element in the description of *octogrammus* which fails to apply to *ordinatus* is the squamation of the cheeks. *Octogrammus* is said to have the subocular lamella minutely scaled, while in all species except *H. decagrammus* the suborbital ring, as well as the suborbital stay, is scaleless. The present species shows some variation in the squamation of the opercles. The lower portion of subopercle is usually naked in our specimens, but is in some of them completely scaled. There may be exceptionally a few scales on adjacent edge of interopercle. We append fin counts in 14 specimens:

D.	A.	P.	Locality.
XIX, 22	23	18	Shana Bay, Iturup Island.
XIX, 23	24	19	Do.
XIX, 23	24	19	Do.
XIX, 23	24	19	Do.
XIX, 23	24	20	Do.
XIX, 23	25	19	Do.
XX, 22	24	19	Do.
XX, 23	24	19	Do.
XIX, 23	24	18	Petropaulski.
XIX, 24	24	18	Do.
XIX, 24	24	19	Do.
XIX, 24	25	18	Do.
XX, 23	23	18	Do.
XX, 23	23	20	Do.

[†] The following is the substance of Cope's description of *C. ordinatus:*
Head $4\frac{1}{3}$; depth 4; eye 5 in head, $1\frac{2}{3}$ in snout, $1\frac{1}{4}$ in interorbital space; D. XIX, 24; A. 26, C. 17; P. 18; scales 13–94–34; branchiostegals 6. Dorsal fins not very elevated, continuous, but well notched at point of union of the two; a dentate flap above each eye; lateral lines of pores 5, only 3 of which extend to the basis of the caudal fin, viz, the

2260. HEXAGRAMMOS STELLERI, Tilesius.

(GREENLING.)

Head 3⅔; depth 4⅓. D. XXIII (XXII to XXV), 19 to 21; A. 23 or 24; scales 110. Form rather slender. Maxillary reaching past front of eye, about to pupil. No teeth on palatines. Scales all strongly ctenoid, except on sides of head; cheeks and opercles largely naked, a patch of scales on upper portions of cheek and opercles, and a small patch sometimes present on middle of cheek. First and fourth lateral lines very short, variable, the first rarely extending beyond middle of spinous dorsal, the fourth to middle of ventrals, rarely beyond; lower line forked in front of middle of ventrals. Caudal fin narrow, emarginate when closed, less densely scaled than in other species, the scales large, in single series; commonly 9 scales in an oblique series between median line and the one above it; scales on sides of head, breast, and prepectoral area smooth, elsewhere strongly ctenoid. Dorsal fins less deeply notched; caudal peduncle narrow, the depth less than length of snout. Supraocular flap small, shorter than diameter of pupil. Color in varying shades of gray and brown or light reddish, blotched, marbled, or barred with dusky, and usually with numerous round silvery spots nearly as large as pupil. In brightly marked specimens there is a series of quadrate dusky blotches along base of dorsal fin, continued on base of fin, much as in *H. octogrammus*. Like the latter, there are radiating dark streaks around the eye, of which the 2 anterior are the most conspicuous and permanent; no humeral spot. North Pacific*

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second, third, and fifth; the first extends to opposite the middle of the second dorsal; the fourth commences below and in front of the basis of the pectoral, and extends to a point a little behind that measured by the extremity of that fin; the inferior series of opposite sides converge and unite a little behind the basis of the ventrals into a single median line, which extends to the branchiostegal fold. The scales are elongate, and nearly truncate distally; on the sides they are in oblique series, but near the dorsal fin from 3 to 5 rows exhibit scales superposed vertically. General color pale orange, with ill-defined blackish shade on the sides, and 7 quadrate blackish spots at the base of the dorsal fin; below bright yellow; dorsal and caudal fin yellowish at base, margins with a broad blackish band; 3 black spots on the middle of the first, and 4 on the middle of the second dorsal fin; anal yellow, with 7 blackish blotches extending anteriorly across the rays; pectoral yellow, with brown spots on the rays and a black one at the base in front; eye with 5 blackish radii, diverging, 2 anteriorly, 1 upward and backward, 1 backward, and 1 downward and backward. Length 14 inches.

* Dr. Gilbert adds the following notes on Alaska specimens:

"Young individuals were dredged in large numbers in the shallow waters of Bristol Bay, at depths of from 4½ to 14½ fathoms. Seining parties brought it in but once, a single young individual, and 1 adult appearing at Unalaska among the prevalent *Hexagrammos octogrammus*. The largest individuals dredged measure about 125 mm.; the adult from Unalaska 345 mm. in length. The characters of the species seem very constant. The dorsal varies from XXIII, 19 to XXIV, 21; the anal from 23 to 24. In 16 specimens the dorsal formula runs as follows: XXIII, 19; XXIII, 19; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 20; XXIII, 21; XXIII, 21; XXIII, 21: XXIII 21; XXIV, 20; XXIV, 20; XXIV, 20. The anal fin shows the following counts in 12 specimens: 23, 23, 23, 23, 23, 23, 24, 24, 24, 24, 24, 24. The body in the young is much more slender than in *H. octogrammus*, is lighter in color, and lacks the round humeral spot present in the latter. The supraocular flap is somewhat smaller, the cheek more extensively naked, the eye larger, and the mucous canal system less strongly developed. The snout, cheeks, opercles, and lower side of head are naked, with the exception of a patch of small loosely imbricated scales, on the upper posterior part of cheek and the upper third of opercles. The dorsal line of pores is very inconspicuous, and terminates in front of the middle of spinous dorsal. In none of our specimens are there traces of a line of pores on middle of sides. The species can be distinguished at once from all others by the slender caudal peduncle, the shallow notch between dorsals, the fin formulæ, the short upper line of pores, which ends under anterior half of spinous dorsal, the largely naked cheeks and opercles, the simple unbranched fourth lateral line, and the extreme roughness of the scales."

from Kamchatka[*] and Unalaska to San Francisco; abundant in Puget Sound, but rather rare among the Aleutian Islands, and scarcely known south of Cape Mendocino; erroneously recorded from Japan, where *Hexagrammos otakii*, Jordan & Starks, has been mistaken for it. (Named for Georg Wilhelm Steller, the indefatigable naturalist of Bering's voyage.)

Hexagrammos stelleri, Tilesius, Mém. Acad. St. Petersb., II, 335, 1809, Kamchatka. (Coll. Steller.)

Hexagrammos asper (Steller, MS.) Tilesius, Mém. Acad. St. Petersb., II, 1810, 340, pl. 15, Kamchatka. (Coll. Steller.)

Labrax stelleri, Pallas, Mém. Acad. St. Petersb., II, 395, 1810.

Labrax hexagrammus, Pallas, Mém. Acad. St. Petersb., II, 1810, 395, pl. 23, fig. 3, Petropaulski, Kamchatka; Pallas, Zoogr. Rosso-Asiat., III, 284, 1811.

Chiropsis nebulosus, Girard, U. S. Pac. R. R. Surv., X, Fishes, 45, 1858, Puget Sound and at Fort Steilacoom. (Coll. Dr. Suckley.)

Chirus trigrammus, Cope, Proc. Amer. Philos. Soc. Phila. 1873, 29, Unalaska.

Labrax hexagrammus, Temminck & Schlegel, Fauna Japonica, 53, pl. 23, 1847; not of Pallas.

Chirus hexagrammus, Günther, Cat. Fishes Brit. Mus., II, 91; in part.

Hexagrammus asper, Steindachner, Beitr. Fische Japans, IV, 10; not of Steller.

Chirus hexagrammus, Günther, Cat., II, 91, 1860.

Chirus nebulosus, Günther, Cat., II, 93, 1860.

Acantholebius nebulosus, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 166.

Hexagrammos hexagrammus, Jordan & Evermann, Check-List Fishes, 434, 1896.

2261. HEXAGRAMMOS SUPERCILIOSUS (Pallas).

(Red Rock Trout.)

Head 4; depth 3½. D. XX, 23; A. 22; scales 107. Body rather robust; supraorbital flap long and slender, densely fringed, its length about equaling vertical diameter of orbit. Scales mostly cycloid, a band of ctenoid scales often present on postaxial region; 8 or 9 scales in an oblique series between second and third rows of pores. A small patch of teeth often present on front of palatines. First and fourth lateral lines long, usually reaching beyond the middle of soft dorsal and anal; caudal very broad, rounded posteriorly, even when fin is closed, the membranes covered basally with small scales, those on median membranes in several series; dorsals very deeply notched. Colors usually bright, but varying through green, brown, and bright red, usually dark green with large round red spots, but extremely variable and sometimes finely mottled. Bering

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[*] Dr. Jordan has the following notes on this species:

"Two specimens from Petropaulski; 1 young example from Unalaska. This species seems much less abundant along the shores of Bering Sea than *H. octogrammus* (*ordinatus*). The Petropaulski specimens give the following data: Dorsal XXII, 21; XXIII, 20; anal 23, 24; pectoral 20. Cheek scaled above and behind the suborbital stay, naked in front of and including the stay, except for a small patch of scales immediately below the stay, present in 1 specimen. Interopercle, subopercle, and opercle naked, except for a small patch of scales on upper part of the latter. Upper lateral line ending under second or fourth spine in 1 specimen, under tenth or twelfth spine in the other; the fourth extends barely to base of ventrals in 1 specimen, to opposite end of basal fifth of ventrals in the other. There are 7, 8, or 9 scales in an oblique series between second and third lines, counted near middle of body. The lowermost line forks at a point slightly nearer base than tip of ventrals, its distance from ventrals less than ½ its distance from vent. Ventrals pointed, extending beyond pectorals and more than halfway to front of anal. The caudal fin is strongly emarginate when closed, becoming truncate when spread. It is scaled on basal half only. Color as usual in the species, the light spots on sides numerous, about as large as pupil; fins bright reddish or orange, especially on basal half."

Island to Monterey; not rare; becoming more common northward; a very showy species, extremely variable in color. Dr. Gilbert observes that the species is abundant in Unalaska. He states that the patch of palatine teeth is an unreliable character, as 5 specimens out of the 9 examined do not exhibit it. The species is well distinguished by the depth of the dorsal notch, the comparative smoothness of the scales, and the large size of the supraocular flap. The upper line of pores extends well back under base of soft dorsal, and the fourth line is unbranched. The sides of the head are scaled, excepting the region over suborbital stay, the snout, and the interopercle. (*superciliosus*, pertaining to the eyebrow.)

Labrax superciliosus, PALLAS, Mém. Acad. St. Petersb., II, 388, 1810, Unalaska (Coll. Joseph Billings); PALLAS, Zoogr. Rosso-Asiat., III, 279, 1811.

Chirus pictus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 132, San Francisco (Coll. Drs. Heermann and Newberry), Humboldt Bay (Coll. Lieut. Trowbridge); GÜNTHER, Cat., II, 93, 1860; LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 54.

Chirus balias, COPE, Proc. Amer. Philos. Soc. Phila. 1873, 28, Captains Harbor, Unalaska. (Coll. Prof. George Davidson.)

Hexagrammus scaber,* BEAN, Proc. U. S. Nat. Mus. 1881, 154, Amchitka, Unalaska (Type, No. 27920. Coll. Bean); JORDAN & GILBERT, Synopsis, 949, 1883.

Chiropsis pictus, GIRARD, U. S. Pac. R. R. Surv., X, Fishes, 43, 1858.

Hexagrammus superciliosus, JORDAN & GILBERT, Synopsis, 644, 1883.

2262. HEXAGRAMMOS LAGOCEPHALUS (Pallas).

Head $3\frac{3}{5}$ to 4 in length; depth $3\frac{3}{5}$ to $3\frac{2}{3}$; eye small, about $5\frac{1}{4}$ in head. D. XX to XXIII, 22 to 24; A. 22 to 24; P. 20 to 21. Outer row of teeth enlarged in both upper and lower jaws. Teeth on vomer and front of palatines. Maxillary extending to below middle of eye in adults, $2\frac{1}{3}$ in head ($2\frac{4}{5}$ in young). A small flap above eye, fringed along the margin; no tentacles on nape. Fins high, the spinous dorsal deeply notched, the last spine somewhat longer than the one preceding; in the adult the fifth spine is the longest, nearly $\frac{1}{2}$ length of head, the third and fourth spines nearly equal to the fifth; from the fifth the spines gradually diminish in height to near the end of the fin, when they become rapidly shortened to form the notch. Caudal very broad at base, convex at its posterior margin even when the fin is closed; pectorals broadly rounded, rather short, the longest rays $1\frac{1}{4}$ to $1\frac{1}{5}$ in head, not nearly reaching vertical from vent; ventral fins $1\frac{2}{3}$ to 2 in head, short and rounded in the young, becoming longer and more pointed in adults; pectoral and ventral rays very broad, especially toward their tips, and much branched; soft rays of dorsal and anal fins cleft on terminal fifth, as in other species, the two halves not diverging; 5 lateral lines on each side as usual, 2 dorsal, a median, and 2 ventral; upper dorsal line continued to beyond middle of second dorsal fin, usually ending under the fourteenth or sixteenth ray; lower dorsal line and the median line extended to base of caudal; upper ventral line originating below and in front of the pectoral fin, passing immediately above base of ventral to which it does not send a separate branch, and terminating opposite middle of anal fin; lower ventral line single on breast, forking in advance of middle of ventral fins, the branches passing to base of caudal. In the young the scales are all ctenoid, except those in midventral region, breast, prepectoral area, and sides of head, all becoming smooth in adult; snout, subocular ring, suborbital stay, interopercle, and usually the lowermost portion of subopercle, scaleless; basal half or more of caudal and basal third of soft dorsal with the membranes densely scaled; pectoral basis also densely scaled; scales on breast not greatly reduced, more than $\frac{1}{2}$ as large as those on middle of sides; median lateral line with 110 pores; 8 or 9 scales in an oblique series between median line and the one above it. Color in most of our specimens a nearly uniform warm brown, lighter on under parts, marked only with irregular small black spots and lines, which may extend on the dorsal and pectoral fins; anal and ventrals black, the thickened tips of the rays in these and the pectoral fins often white; a large, blackish humeral spot in young specimens, often disappearing in adults. One specimen (Iturup Island) has the upper parts, including dorsal and caudal fins, bright reddish, with some dusky blotches and cloudings, the humeral spot conspicuous. The fin rays are as follows in 12 specimens:

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* The following is Dr. Bean's description of *H. scaber:*
"Head $4\frac{1}{2}$ without opercular flap; depth $4\frac{1}{2}$. D. XXI, 24; A. 24; lateral line about 107; transverse about 50; eye 3 in head, equal to interorbital. Body oblong, moderately compressed; upper outline of head convex, but with a slight frontal depression; least height of tail equals $\frac{1}{3}$ of head; jaws equal; the maxillary not quite extending to anterior margin of pupil; teeth on jaws and vomer, none on palatines; a tentacle over each eye. Origin of spinous dorsal directly over base of pectoral, the longest spine 11 in body; the longest dorsal ray equal to postorbital part of head; dorsals deeply notched; base of anal 3 in body; vent equidistant between tip of snout and base of caudal fin; caudal decidedly forked; pectorals not quite reaching vent, the length equal to head with opercle flap; distance of ventrals from snout more than twice length of ventrals, which is 7 in body; 6 lateral lines on each side, the uppermost meeting its fellow on the opposite side in front of the dorsal, and continued forward on the nape in a single short line; it runs backward close to the base of dorsal and ends at beginning of last third of soft dorsal; second beginning at nape, $\frac{1}{2}$ as far from the uppermost as it is from the third, and extending to the caudal; the third beginning at the upper end of the gill opening and ending on the caudal; the fourth a little above the pectoral, curving very slightly downward and disappearing about the middle of the body, not so well developed as the rest; the fifth originates close under the pectoral, near the gill opening, passes above the ventral and on the lower part of the side of the body, ending at about the beginning of the last third of anal; the sixth meets its fellow of the opposite side a little behind the ventral base, and extends forward in a single line, and runs backward close to the base of the anal fin, ending on the caudal; scales everywhere very rough. Light brown, silvery below; each dorsal with 3 dark blotches, smaller than eye, not reaching base of fin; pectorals, ventrals, and anal immaculate. Coast of Alaska; known from young specimens only, the largest 3 inches long." (Bean). We have examined these specimens and find them, beyond question, the young of *H. superciliosus*.

D.	A.	P.	D.	A.	P.
XX, 24	22	21	XXII, 23	23	21
XXI, 23	23	20	XXII. 23	23	21
XXII. 22	22	21	XXII, 23	23	21
XXII, 23	22	21	XXII, 23	24	21
XXII, 23	23	20	XXII, 24	23	21
XXII, 23	23	21	XXIII, 23	23	21

West shore of Bering Sea; not known from Alaska. We have numerous specimens from Robben Island, 1 specimen each from Bering and Iturup islands. Young specimens up to 20 cm. in length have the scales all rough ctenoid as in *H. stelleri* and *H. octogrammus*. Specimens 30 cm. long have most of the scales smooth, a few along middle of sides still ctenoid. In an adult 54 cm. long all the scales are smooth, those on head and nape partially embedded. In shape and general appearance this species very much resembles *H. octogrammus*. It has a deep caudal peduncle, a convexly rounded caudal fin, and a rather bluntly rounded snout.* (λαγώς, hare; κεφαλή, head.)

Labrax lagocephalus, PALLAS, Mém. Ac. St. Petersb., II, 1810, 384, Kuril Islands.

Grammatopleurus lagocephalus, JORDAN & EVERMANN, Check-List Fishes, 435, 1896.

Hexagrammus decagrammus, BEAN & BEAN, Proc. U. S. Nat. Mus. 1896, 383, specimens from Petropaulski; not of PALLAS.

Hexagrammos lagocephalus, JORDAN & GILBERT, Fishes of Bering Sea, in Rept. U. S. Fur Seal Investigations, 1898.

700. OPHIODON, Girard.

(CULTUS CODS.)

Ophiodon, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 133 (*elongatus*).

Oplopoma, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 135 (*pantherina* = *elongatus*).

Body elongate, low, little compressed. Head long, rather pointed, its surface scaleless. Mouth terminal, very large. Jaws with very strong, sharp, unequal teeth, some of them canine-like; long series of cardiform teeth on vomer and palatines. Gill openings very wide, the membranes not united, free from the isthmus. Preopercle with a few bluntish spines; a dermal flap above the eye. Scales very small, becoming smooth with age. Lateral line single, continuous. Dorsal fin long, deeply notched, the spines about 24 in number, slender and flexible, the middle ones highest; anal fin long, without distinct spines; ventrals I, 5, inserted somewhat behind pectorals; pectoral fin broad; pyloric cæca very numerous; gill rakers tubercle-like. Species of large size; among the largest of the cottiform fishes; used as food; the flesh livid blue or green in color. (ὄφις, snake; ὀδούς, tooth.)

2263. OPHIODON ELONGATUS, Girard.

(CULTUS COD; BLUE COD; BUFFALO COD.)

Head $3\frac{1}{2}$; depth 5. D. XXV, 21; A. 22. Head large, the snout sharp, conic. Mouth very large, the lower jaw prominent; maxillary reaching beyond orbit; each jaw with a series of large pointed teeth bent inward and immovable; front of upper jaw with 2 to 4 larger canines; outside of the series of large teeth each jaw has numerous small, sharp teeth; vomer and palatines with a single row of canines; supraorbital tentacle much shorter than pupil; dorsal fin beginning above preopercle, the fin very deeply notched, the highest spines nearly $\frac{1}{3}$ length of head; caudal emarginate. Dark brown above, much mottled; dorsal fin and whole upper part of body covered with small rusty brown spots of varying size and hue; lower parts of body of a livid bluish green, especially in the adult, the flesh and all membranes tinged with green; ground color often bluish or reddish tinged; young sometimes bright green; fins dusky, mottled, the dorsal and caudal with a very narrow, pale edging. Length 40 inches. Pacific coast of America, Sitka to Santa Barbara; very abundant, reaching a weight of 30 to 40 pounds, being one of the most important food fishes on the coast. (*elongatus*, elongate.)

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* It will be noted that all of the species of *Hexagrammos*, except *H. otakii*, were known to Pallas. *H. otakii* has also been long known to collectors, though but recently distinguished from *H. stelleri*. It seems probable that all existing species of *Hexagrammos* are now known to us. There are uniformly 5 lateral lines on each side in all species of *Hexagrammos*. The second, third, and fifth lines are complete in all, while the first and fourth are variously developed, and offer valuable specific characters.

Ophiodon elongatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 133, San Francisco (Type, No. 276. Coll. Dr. Heermann), Humboldt Bay, California (No. 277. Coll. Lieut. Trowbridge); GIRARD, U. S. Pac. R. R. Surv., X, Fishes 48, pl. 18, figs. 4 to 7, 1858; GÜNTHER, Cat., II, 94, 1860; JORDAN & GILBERT, Synopsis, 646, 1883.

Oplopoma pantherina, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 135, Cape Flattery, Washington (Type, No. 275. Coll. Lieut. Trowbridge); GIRARD, U. S. Pac. R. R. Surv., X, Fishes, 46, pl. 18, figs. 1 to 3, 1858.

Ophiodon pantherinus, GÜNTHER, Cat., II, 93, 1860.

701. ZANIOLEPIS, Girard.

Zaniolepis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1857, 202 (*latipinnis*).

Body elongate, little compressed, tapering from the nape to the long and slender tail. Head short, conical, the profile decurved. Mouth rather small, low, terminal, horizontal; cardiform teeth on the jaws, vomer, and palatines; no supraorbital cirri; preopercle with spines. Gill membranes not united, free from the isthmus; gill rakers tubercle-like. Scales small, imbricated, extremely roughly ctenoid. Lateral line single, continuous. Dorsal fin with about 20 spines, some of the anterior spines more or less elevated, a deep notch between the spines and soft rays; anal fin very long, with 3 spines, the second of which is longest; ventrals I, 5, long, inserted a little behind pectorals; pectorals moderate; pyloric cæca few (5 or 6). North Pacific, in deep water; small fishes, not valued as food; singular in form and appearance, and bearing some resemblance to the *Icelus*-like *Cottidæ*. (ξανίον, a comb or card; λεπίς, scale; hence more correctly spelled with an initial X.)

a. Third dorsal spine greatly elevated, much longer than head; head less than ¼ length of body; no supraorbital flap. LATIPINNIS, 2264.
aa. Third dorsal spine moderate, shorter than head; head more than ¼ length of body; supraorbital flap present. FRENATUS, 2265.

2264. ZANIOLEPIS LATIPINNIS, Girard.

Head 4⅓; depth 5¼. D. XXI–I, 11; A. III, 17. Body elongate, fusiform, scarcely compressed, the dorsal outline rising rather steeply. Mouth small, horizontal, low, the maxillary reaching nearly to the middle of the eye; the premaxillary entirely below the eye. Eye very large, longer than snout, 3½ in head; no cirrus above eye; preorbital wide, partly covering the scaly maxillary; interocular space rather narrow, somewhat concave, nasal spines present; preopercle with 3 sharp spines. Dorsal spines slender, stiff, the first and second longest, usually greatly produced, but stiffish to the tip, scarcely connected by membrane, reaching to nearly middle of second dorsal, and more than ½ the total length of the fish, but often much shorter; a deep notch between spinous and soft parts of dorsal; second dorsal high, its rays gradually shortened; anal long, its spines high; ventrals elongate, wide apart, reaching past front of anal; pectorals short and narrow; caudal short, slightly emarginate. Head and body everywhere covered with minute, imbricated, very rough, shagreen-like scales. Olivaceous, the body and upper fins spotted with rusty brown; the vertical fins marked with blackish; a black streak before eye; suborbital bluish silvery. Length 12 inches. Pacific coast of the United States, from San Francisco northward; abundant in deep water; a slender fish of dry, firm substance and singular form. Here described from specimens from off Point Reyes. (*latus*, broad; *pinna*, fin.)

Zaniolepis latipinnis, Girard, Proc. Ac. Nat. Sci. Phila. 1857, 202, Fort Steilacoom, Puget Sound (Coll. Dr. Suckley); Girard, U. S. Pac. R. R. Surv., x, Fish., 73, pl. 17, figs. 5 and 6, 1858; Günther, Cat., II, 94, 1860; Jordan & Gilbert, Synopsis, 647, 1883.

2265. ZANIOLEPIS FRENATUS, Eigenmann.

Head 3⅗ in length of body; depth 5¾. D. XX–I, 12; A. III, 15; eye 3¾ in head; snout 3¾; maxillary 3; third dorsal spine 1⅓; second dorsal ray 2; pectoral 1⅕; ventral 1½; second anal spine 3⅓; caudal 1⅘. Form of *Z. latipinnis*, slender, tapering backwards, anterior profile gently convex, the snout sharp, the lower outline scarcely curved. Mouth at lower side of snout horizontal, the maxillary reaching vertical from front of pupil, 3 in head. A blunt spine on head of maxillary in front of nostrils. Teeth in broad cardiform bands on jaws, vomer, and palatines; no canines. Nasal spines very strong, much more developed than in *Z. latipinnis*. Eye very large, 3⅔ in head. Interorbital space narrower than in *Z. latipinnis*, strongly concave, with a deep, median, scaleless groove, widening anteriorly. A long, narrow, supraorbital cirrus, more than ½ as long as diameter of eye, on supraorbital rim behind middle of eye. (A minute flap similarly placed in *Z. latipinnis*.) Two or 3 preopercular spines developed, with 1 or 2 on shoulder; no other spines on head. Gill rakers short, tubercular, not toothed, 10 or 11 on anterior arch. Gill membranes narrowly joined across throat. Dorsal beginning over upper angle of gill opening; spines of anterior part of fin with membranes deeply incised, the first 3 or 4 being more than half free; none of the spines produced into filaments, all stiff to their tips, which are pungent; the anterior spines varying in relative length, but the third seems normally the longest, 1⅓ to 1½ in head, the second and third about equal, the fin thence shortened to the twentieth spine, the twenty-first again lengthened; anal spines strong, the second the longest, ½ longer than third; anal rays free at tip and thickened, becoming gradually higher posteriorly, the last rays not abruptly lengthened as in *Z. latipinnis;* pectoral long, ⅘ head, its upper portion longest, the lower rays thickened towards tips, and serving as a support as the fish rests on the bottom; ventrals long, the outer rays thickened, longest barely reaching vent; caudal truncate. Scales as in *Z. latipinnis*, minute, but regularly disposed, their posterior edge with 5 to 8 strong spines, nearly as long as width of scale; tubes and pores of lateral line not externally visible; head and body entirely scaled, except snout, premaxillaries, part of interorbital space, and lower side of head; series of spinous scales extend to tips of rays and spines of dorsal, caudal, and pectoral fins. Color, back with a series of 6 quadrate blotches, corresponding to or alternating with a similar series of larger blotches below the lateral line, the spaces between with vermiculating lines of gray, inclosing darker spaces, the light lines sometimes produced below the lateral line in V-shaped or) (-shaped markings; head dark, a silvery line on suborbital chain, edged above with black; spinous dorsal translucent, with round, black spots, frequently more or less confluent to form horizontal or oblique streaks; soft dorsal similarly, but much less distinctly, marked; caudal dusky, black in males with white posterior margin; anal black in males with white margin, in females unmarked; pectorals with 2 blackish bars, white edged; ventrals black in males, white edged, plain in females; in males the lower parts of body are uniformly blackish. (Gilbert MS.) Off shore banks of southern California. Here described from a specimen, 8 inches long, taken off the Santa Barbara Islands, by the *Albatross*. (*frenatus*, bridled.)

Zaniolepis frenatus, EIGENMANN, West American Scientist, Nov. 9, 1889, 10, Cortez Banks, off San Diego. (Coll. Capt. Carter.)

702. OXYLEBIUS, Gill.

Oxylebius, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 277 (*pictus*).

Body oblong, somewhat compressed. Head conical, very slender acuminate, the profile somewhat concave. Mouth small. Jaws each with a band of teeth, the outer series considerably enlarged; minute teeth on vomer, few or none on palatines. Top of head with dermal flaps. Preopercle with 2 blunt spines. Gill membranes broadly connected, free from the isthmus; gill rakers short, not very stout. Scales small, ctenoid; a single lateral line. Dorsal fin emarginate, with about 16 low, rather strong spines; soft dorsal moderate, its membrane closely scaled; anal with 3 stout spines, the second the longest; caudal truncate; pectorals rather long, their bases not procurrent; ventrals moderate, inserted well behind pectorals. Pyloric cæca few. Small fishes of bright coloration. (ὀξύς, sharp; *Lebius*, an old synonym of *Hexagrammos*, from λεβίας, a kind of a small fish suitable to be cooked in λέβης, a kettle.)

2266. OXYLEBIUS PICTUS, Gill.

Head 3⅓; depth 3⅓. D. XVI, 15; A. III, 13. Body rather deep, compressed. Head little compressed, slender, pointed; lips thick; lower jaw slightly included; maxillary small, barely reaching eye. Eyes large, about equal to snout, 4 in head; nasal spines present; interocular space narrow. Scales on sides of head very small; scales on body small, ctenoid, with strong horizontal striæ, those on breast minute. Dorsal fin continuous, its spines stiff, the middle one highest, and all considerably lower than the soft rays; second anal spine longer than the third, about equal to the soft rays; pectorals barely reaching anal; ventrals to past vent. Tawny grayish, with about 6 black bars, alternating with areas of pale orange, the latter obscured by dusky spots and blotches; the dark bars extending on the fins, the first across the nape, the second across the middle of the spinous dorsal, the third broader, across posterior part of spinous dorsal and front of anal; 1 across middle of soft dorsal, 1 on posterior part, and 1 at base of caudal, the bars about as wide as the interspaces, and their edges irregular, but sharply defined; pectorals and caudal orange, with cross series of spots; ventrals largely black; under side of head orange, freckled, spotted with pale; 2 fringed cirri over each eye, scarlet; breast and belly marbled. Length 10 inches. Rocky shores, on the Pacific coast of the United States from Monterey northward to Puget Sound, living among algæ; abundant, but rare in collections, being seldom taken in nets. Here described from specimens from Monterey. A most beautiful and active little fish. (*pictus*, painted.)

Oxlyebius pictus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 277, California; no definite locality. JORDAN & GILBERT, Synopsis, 648, 1883; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 802, pl. 78.

Family CLXXIX. COTTIDÆ.*

(THE SCULPINS.)

Body moderately elongate, fusiform or compressed, tapering backward from the head, which is usually broad and depressed. Eyes placed high, the interocular space usually narrow; a bony stay connecting the suborbital with the preopercle, usually covered by the skin; upper angle of preopercle usually with 1 or more spinous processes, the head sometimes wholly unarmed. Teeth equal, in villiform or cardiform bands on jaws, and often on vomer and palatines; premaxillaries protractile; maxillary without supplemental bone. Gills 3½ or 4, slit behind the last small, often obsolete; gillrakers short, tubercle-like or obsolete; gill membranes broadly connected, often jointed to the isthmus. Body naked, or variously armed with scales, prickles, or bony plates, but never uniformly scaled; lateral line present, simple, sometimes chain-like. Dorsal fins separate or somewhat connected, the spines, 6 to 18 in number, usually slender, sometimes concealed in the skin, the soft part elongate; caudal fin separate, rounded; anal fin similar to the soft dorsal, without spines; pectoral fins large, with broad procurrent bases, the rays mostly simple, the upper sometimes branched; ventrals thoracic, rarely entirely wanting, the rays usually I, 3 to I, 5, their insertion well forward. Pseudobranchiæ present. Vertebræ numerous, 30 to 50. Scapular arch normal; myodome developed; actinosts large, partly intervening between hypercoracoid; ribs sessile on the vertebræ. Pyloric cæca usually in small number (4 to 8); air bladder commonly wanting. Genera about 60; species about 250, mostly of the rock pools and shores of northern regions; many species found in fresh waters; some of the salt-water species descending to great depths. Most of the species are of small size and singular aspect, and none is valued as food. The family is an extremely varied one, which can not readily be thrown into subordinate groups. Almost every species has an individuality of its own, and among the marine forms it is necessary to recognize almost as many genera as species. It is impossible to throw these small genera together into large groups. Of the American forms, probably *Jordania* is nearest the primitive scaly stock, from which such forms as *Zaniolepis* and *Oxylebius* are also descended. *Hemitripterus* and *Nautichthys* seem to be the most specialized genera. Fresh-water degeneration is exemplified in *Cottus* and *Uranidea*; deep-water degeneration in *Zesticelus* and *Cottunculus*, and the degradation associated with sluggish habits in *Ascelichthys, Psychrolutes*, and *Gilbertina*. (*Triglidæ*, group *Cottina*, part; group *Scorpænina*, part, Günther, Cat., II.)

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* We are under obligations to Dr. Wilbur W. Thoburn for many notes on the American *Cottidæ*.

I. Spinous dorsal evident, not concealed in the flesh nor indistinguishable from soft part; head with spines or tubercles (except in rare cases), its bones not all hidden in lax skin.
a. Ventral fins well developed.
  b. Pectoral fins separate, not coalescent below.
    c. Ventral rays I, 5; vomer and palatines with teeth; gill membranes broadly united, free from the isthmus.
      JORDANIINÆ:
        d. Body more or less scaly above, or with rough plates or prickles.
          e. Dorsal fin very long, of 17 spines; anal long; no slit behind last gill arch; back with rough scales; sides with oblique serrated folds; ventral fins well behind pectorals. JORDANIA, 703.
          ee. Dorsal fin moderate, of 12 or 13 spines; anal long; body very slender; sides of back with rough plates.
            f. Last gill arch with no slit behind it; chin with 2 barbels. PARICELINUS, 704.
            ff. Last gill arch with a slit behind it; chin without barbels. ALCIDEA, 705.
      SCORPÆNICHTHYINÆ:
        dd. Body covered with smooth skin; a slit behind last gill; dorsal rays 11; body rather robust. SCORPÆNICHTHYS, 706.
    cc. Ventral rays not I, 5; usually I, 3, sometimes I, 2, or I, 4.
      g. Spinous dorsal shorter than soft part, of less than 13 spines.
      HEMILEPIDOTINÆ:
        h. Body definitely more or less scaly above, the scales sometimes arranged in bands, or sometimes modified as bony plates, these usually placed along lateral line or at base of dorsal (skin naked in *Artediellus*).
          i. Last gill arch without slit behind it; gill membranes united, free from the isthmus.
            j. Vomer and palatines with teeth.
              k. Preopercular spine with 1 to 5 enlarged hooks or antler-like processes above, besides the 2 on its bifid or emarginate tip.
                l. Back above lateral line evenly scaly; spinous dorsal emarginate. CHITONOTUS, 707.
                ll. Back above lateral line with a series of enlarged plates or scales, the space above and below this naked.
                  m. Lateral line armed with a series of bony plates; preopercular-like processes usually numerous.
                    n. Dorsal fin with 1 or more of the anterior spines elevated and filamentous; scattered plates behind axil. TARANDICHTHYS, 708.
                    nn. Dorsal fin without filamentous spines; no plates behind axil. ICELINUS, 709.

mm. Lateral line unarmed or with small hidden scales only; body rather robust; no filamentous spines; top of head scaly; preopercular spine with but 1 hooked process above. ASTROLYTES, 710.

kk. Preopercular spine bifid or simple, without hooks or antler-like processes above.

o. Vent very close behind ventrals; supraorbital cirrus very high. ARCHISTES, 711.

oo. Vent well behind ventrals; supraorbital cirrus low or wanting.

p. Back with a distinct band of scales on each side above lateral line; head smooth above, the interorbital space flat or concave.

q. Interorbital space flat; head without cirri above. ARTEDIUS, 712.

qq. Interorbital space concave; top of head with short cirri. AXYRIAS, 713.

pp. Back covered with rough scales above; head very rough.

r. Preopercular spine more or less evidently bifurcate; a small cirrus above eye. RUSCARIUS, 715.

rr. Preopercular spine simple; sides scaly below lateral line. RASTRINUS, 716

ppp. Back with a series of larger plates along each side below base of dorsal fin above lateral line; head naked above; sides with scattered scales; body and head slender; skin above with warty scales and prickles. ICELUS, 717.

pppp. Back and sides wholly naked; preopercular spine simple, strongly hooked upward. ARTEDIELLUS, 714.

jj. Vomer with teeth, palatines with none; the side with a series of bony keeled spinous plates.

t. Plates on head larger, similar to those along lateral line; body very slender, depressed above. RADULINUS, 718.

tt. Plates on head very small; body rather robust; preopercle with 4 spines, the upper hooked upward. STELGISTRUM, 719.

ii. Last gill arch with a distinct slit behind it.

u. Sides of body with oblique serrated folds; preopercular spines small, simple or bifid; gill membranes wholly free from isthmus; spinous dorsal not emarginate; no palatine teeth; body slender; ventrals moderate.

v. Caudal fin truncate or slightly emarginate.

w. Back with a series of bony tubercles along base of dorsal; body not very slender.

x. Breast naked, with cross folds of skin, containing mucous tubes. TRIGLOPS, 720.

xx. Breast with small scales and no cross folds. STERNIAS, 721.

ww. Back without bony tubercles along base of dorsal; body very slender; lower rays of pectoral produced. PRIONISTIUS, 722.

vv. Caudal fin deeply forked; body very slender; lower pectoral rays produced. ELANURA, 723.

uu. Sides of body without oblique, serrated folds; no bony tubercles along dorsal; body very robust.

y. Back with 1 or 2 bands of large rough scales; lateral line without bony shields; palatines with teeth; preopercular spine short.

z. Back with one band of scales; ventrals greatly elongate; gill membranes free from isthmus; spinous dorsal not notched. MELLETES, 724.

zz. Back and sides with 2 separate bands of coarse rough scales; ventrals moderate; spinous dorsal notched.

a'. Gill membranes partly free, forming a broad fold across isthmus; naked skin of body firm and thick. HEMILEPIDOTUS, 725.

aa'. Gill membranes united, not forming a distinct fold across isthmus (unless the skin is shrivelled); naked skin thin and lax. CALYCILEPIDOTUS, 726.

yy. Body without scales, but with a band of coarse bony plates along lateral line; gill membranes broadly united to the isthmus.

b'. Preopercular spine simple, very long and strong. ENOPHRYS, 727.

bb'. Preopercular spine extremely long, armed above with recurved hooks. CERATOCOTTUS, 728.

hh. Body not definitely scaly above, the skin smooth, prickly, villous, or with scattered scaly processes; no bony armature to lateral line.

COTTINÆ:

c'. Skin smooth or warty or velvety, not evenly hispid with stiff prickles.

e'. Gill membranes broadly united to the isthmus, not forming a fold across it; fresh-water species with the head feebly armed; palatine teeth present or absent.

f'. Ventrals with a concealed spine and 4 soft rays; skin often prickly. COTTUS, 729.

ff'. Ventrals with a concealed spine and 3 soft rays; skin not prickly; palatine teeth usually obsolete. URANIDEA, 730.

ee'. Gill openings narrowly joined to the isthmus, without fold. [LEPTOCOTTUS, 743.]

eee'. Gill membranes free from the isthmus or else forming a broad fold across it.

g'. Palatine teeth none.

h'. First dorsal spine not especially elevated.

i'. Preopercle with 3 spines only, the upper straight, the third turned downward; skeleton well ossified; lateral line developed, with or without concealed plates.

j'. Lower jaw shorter than upper; suprascapula with a single spine. MYOXOCEPHALUS, 731.

jj'. Lower jaw longer than upper; suprascapula with a double spine, the upper branch shorter. MEGALOCOTTUS, 732.

ii'. Preopercle with 4 spines, the lowermost or fourth turned downward; bones of head more or less cavernous; lateral line often modified or reduced to scattered pores.

k'. Upper preopercular spine curved or hooked upward or else obsolete and hidden in the skin; skin smooth; occipital ridges little developed.

l'. Nasal spines obsolete; bones of head soft and spongy; lower jaw projecting; lateral line reduced to scattered pores; deep water sculpins allied to *Psychrolutes*.

m'. Vomer with teeth; palatines with none.

n'. Preopercular spines distinct, uppermost long, sharp.

o'. Dorsals well separated. ZESTICELUS, 733.

oo'. Dorsals contiguous. DASYCOTTUS, 734.

nn'. Preopercular spines very short, hidden in the skin; dorsal fin continuous. COTTUNCULUS, 735.

mm'. Vomer and palatines toothless. MALACOCOTTUS, 736.

ll'. Nasal spines strong; bones of head firm; lower jaw included.

p'. Ventral fins very long, reaching past front of anal. ARGYROCOTTUS, 737.

pp'. Ventral fins moderate, not reaching vent. POROCOTTUS, 738.

kk'. Upper preopercular spine straight; lateral line chain-like; vomer with teeth, an evident slit behind last gill.

q'. Top of head with ridges or crests; marine species. ONCOCOTTUS, 739.

qq′. Top of head unarmed, or nearly so; lacustrine species. Triglopsis, 740.

kkk′. Upper preopercular spine stout, armed with 2 or 3 antler-like processes; slit behind last gill small or wanting; vomer toothless. Gymnocanthus, 741.

hh′. First dorsal spine elevated; skin perfectly smooth; gill membranes forming a broad fold across isthmus. Leiocottus, 742.

gg′. Palatine teeth present (rarely obsolete in one species).

r′. Gill membranes narrowly joined to the isthmus, not forming a fold; preopercular spine with antler-like processes; skin smooth. Leptocottus, 743.

rr′. Gill membranes free from the isthmus; preopercular spine shorter; head and sides usually with many short cirri.

s′. Skin of sides with scattered prickles or rudimentary scales; preopercular spine bifid; head pointed. Clinocottus, 744.

ss′. Skin perfectly smooth, without scales or prickles.

t′. Preopercular spine long and sharp, sometimes with 1 antler-like process above; snout acute. Oligocottus, 745.

tt′. Preopercular spine sharp, curved, simple; snout acute. Oxycottus, 746.

ttt′. Preopercular spine short and blunt; snout more or less obtuse. Blennicottus, 747.

rrr′. Gill membranes free from the isthmus; no cirri; preopercular spine slender, hooked upward. [Artediellus, 714.]

Blepsiinæ:

cc′. Skin almost everywhere rough with small bluntish prickles; first dorsal elevated in front; head small, compressed.

u′. Gill membranes free from the isthmus; ventrals small.

v′. Spinous dorsal not emarginate; no smooth areas on body. Histiocottus, 748.

vv′. Spinous dorsal deeply notched; sides with smooth areas. Blepsias, 749.

uu′. Gill membranes united to the isthmus; ventrals long.

w′. First dorsal little elevated, its base scarcely raised above occiput. Nautiscus, 750.

ww′. First dorsal greatly elevated, its base raised abruptly from the depressed occiput. Nautichthys, 751.

Hemitripterinæ:

gg. Spinous dorsal longer than soft part, of 14 to 18 spines; skin rough, with prickles and tubercles; teeth on vomer and palatines; gill membranes free from isthmus; no slit behind last gill.

x′. Spinous dorsal of 15 spines, not notched. Ulca, 752.

xx′. Spinous dorsal of 16 to 18 spines, deeply notched, the anterior spines highest. Hemitripterus, 753.

Synchirinæ:

bb. Pectoral fins continuous around the throat.

y′. Back with spinous scales; gill membranes free from isthmus; no slit behind last gill; teeth on vomer and palatines; preopercle with a short bifid spine; ventrals inserted far back. Synchirus, 754.

Ascelichthyinæ:

aa. Ventral fins wholly wanting. Skin perfectly smooth; no slit behind fourth gill; gill membranes free from isthmus; teeth on vomer and palatines. Ascelichthys, 755.

Psychrolutinæ:

II. Spinous dorsal not evident, its slender spines wholly hidden in the skin or else indistinguishable from soft rays; head unarmed, its bones hidden in lax skin; skin smooth; no slit behind last gill; gill membranes broadly joined to the isthmus; no teeth on vomer or palatines; maxillary covered by skin of preorbital; ventrals moderate I, 3, the base adnate to body.

z'. Spinous dorsal wholly hidden in the skin; bones of head not greatly cavernous; lower jaw U-shaped, its rami widely separated. PSYCHROLUTES, 756.

zz'. Spinous dorsal evident, the spines not wholly hidden; bones of head cavernous; lower jaw long, U-shaped, its rami approximate at base. GILBERTINA, 757.

703. JORDANIA, Starks.

Jordania, STARKS, Proc. Ac. Nat. Sci. Phila. 1895, 410 (*zonope*).

Body elongate, not greatly compressed; head moderate, partly scaled, with dermal flaps above; mouth moderate, with bands of villiform teeth on jaws, vomer, and palatines; body above lateral line closely covered with strongly ctenoid scales; lower half of body with plate-like folds of skin, running obliquely downward and backward from lateral line to within a short distance of anal fin, the posterior edge of each fold finely and sharply serrate; gill membranes united, free from isthmus; a slit behind last gill arch. Three preopercular spines, only the middle one well developed. Spinous dorsal with a very long base, of about 17 spines, longer than the soft dorsal; anal long; ventrals I, 5, inserted much behind pectorals. Vertebræ 10 + 36 = 46. One species; in waters of moderate depth; a singular genus, approximating the *Hexagrammidæ*. ("I take great pleasure in naming this remarkable genus for my teacher in ichthyology, David Starr Jordan." Starks.)

2267. JORDANIA ZONOPE, Starks.

Head $3\frac{1}{2}$; depth $5\frac{1}{2}$. D. XVII, 15; A. 22; pores in lateral line 50; orbit $3\frac{2}{3}$ in head; maxillary $3\frac{1}{3}$; longest dorsal spine $1\frac{5}{6}$; longest dorsal ray $2\frac{1}{5}$; longest anal ray $2\frac{1}{3}$; length of ventrals $1\frac{3}{4}$; pectorals $\frac{1}{4}$ longer than head; caudal $1\frac{4}{5}$. Body rather elongate, compressed posteriorly, not much, if any, anteriorly; the back not elevated; dorsal and ventral outlines almost straight from head to caudal peduncle; head not large, profile from front of dorsal to eyes nearly horizontal and straight, then abruptly turning steeply downward to end of snout; lower profile gently curved from chin to ventral fins; mouth small, the maxillary not reaching the vertical from front of orbit; jaws about equal, or the lower slightly projecting; teeth in villiform bands on jaws, vomer, and palatines; eyes large, set high in head, a little shorter than snout; interorbital space deeply concave, $\frac{1}{2}$ as wide as eye; a slip of skin, $\frac{1}{2}$ as long as the diameter of the eye, over the anterior edge of each eye, and a longer one over the posterior edge; a few minute fleshy slips on nape; nasal spines long and sharp, somewhat curved back; spine on preopercle simple, hooked up, a minute spine above it and a blunt spine below; posterior end of opercle prominent, forming a blunt spine; opercle produced posteriorly in a flap, which lies in a shallow groove in the shoulder girdle; no opercular spine; gill membranes united, but not joined to the isthmus; a distinct slit behind fourth gill arch; branchiostegals 5. Top of head to middle of eyes, opercles, and upper part of preopercles closely covered with small rough scales, head otherwise naked; body above lateral line completely covered with ctenoid scales, not very regular in size, arranged in about 67 series; lower half of body covered to within a short distance of anal with about 50 oblique plate-like folds of skin, the posterior edges of which are finely and sharply serrate, the pores of lateral line situated in the upper end of these folds; pectoral base, belly, and a narrow space along base of anal naked; fins, with the exception of pectoral, which has a few rough scales on the rays, naked. Dorsal spines slender, the first one inserted in advance of pectoral base, directly over the upper end of gill opening, the fin somewhat rounded in outline, the spines not varying greatly in length, with the exception of 2 or 3 on each side; soft dorsal a little lower than spinous, the rays subequal, its base a little shorter than the base of first dorsal, and slightly longer than the length of head; ventral fins long, inserted well backward, the base nearly $\frac{1}{3}$ a head's length behind pectorals, their tips reaching past front of anal fin, their length equal to the distance from snout to edge of preopercle; the pubic bone very prominent; pectoral fins long and curved upward, the middle rays the longest, reaching past tips of ventrals and front of anal to the space between dorsals, the ends of lower rays free, the width of the fin at its base contained 3 times in length of head; caudal rounded. Color in spirits, blackish, with traces of 4 or 5 darker cross bars on back; sides below lateral line mottled, faint dark spots along lateral line, more conspicuous posteriorly; a dark bar $\frac{1}{2}$ as wide as eye, running from eye downward across cheek to anterior end of interopercle, bordered on each side by a light streak, a similarly bordered bar running across top of head, slightly turning around posterior margin of orbit, downward along margin of preopercle, and ending on posterior end of interopercle; snout abruptly black, lips dark; fins all dark and slightly mottled; tips of ventral, anal, and caudal rays a little lighter; caudal and pectoral dark at base; slips on top of head black; belly very finely dusted with minute dark points. Puget Sound, in 4 to 8 fathoms; types, 3 specimens taken in channel rocks at Point Orchard, near Seattle, the largest 4 inches in length. The life colors of this brilliant species were not taken. There is in life much red on the lateral plates and elsewhere on the body and fins, which disappears at once in alcohol. (ζώνη, zone; ὀπή, window, from the banded eye.)

Jordania zonope, STARKS, Proc. Ac. Nat. Sci. Phila. 1895, 410, Point Orchard, Puget Sound (Type, No. 3124, L. S. Jr. Univ. Mus. Coll. Maude Parker and Adam Hubbard); JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 802, pl. 79.

704. PARICELINUS, Eigenmann & Eigenmann.

Paricelinus, EIGENMANN & EIGENMANN, West American Scientist, Nov. 9, 1889, 131 (*hopliticus*).

Ventral I, 5. Spinous dorsal well developed; gills 3½, no slit behind the last; vomer and palate with teeth. Gill membranes (probably) forming a fold across the isthmus. Sides covered with stiff, villiform prickles; a series of large plates, each ending in a large recurved spine, along the bases of the dorsals. Head well armed, the occiput, preopercle, suborbital stay, preorbital, and part of the supraorbital with spines; nasal spines present; chin with 2 barbels. Branchiostegals 6. Soft dorsal and anal long. An imperfectly known genus, evidently allied to *Jordania*, found in rather deep water in California. (*παρα*, near; *Icelinus*.)

2268. PARICELINUS HOPLITICUS, Eigenmann & Eigenmann.

Head 4; depth 6½. D. XII, 19; A. 23. Body elongate, subcylindrical forward, somewhat compressed behind; region between dorsal armature flat. Snout pointed. Eye large, elevated, 1 in snout, 3½ in head. Interorbital region with a deep median groove and 2 shallower grooves, its width less than diameter of pupil. Upper posterior portion of orbit strongly serrate. Posterior margin of preorbital serrate. Suborbital stay with 2 strong upward directed spines behind the eye. Top of head depressed, a series of 3 spines on either side, the posterior 2 removed from the anterior one; 2 small spines above posterior part of each eye. Mouth large, maxillary reaching to below anterior margin of pupil, 3½ in head. Both jaws with bands of teeth, the outward anterior ones recurved; vomer and palatines with smaller teeth. A barbel on either side of the lower jaw about as long as pupil. Origin of spinous dorsal above the posterior portion of the opercle, its end above the origin of the anal; caudal broad, rounded; ventrals reaching the second anal ray; pectoral very broad, reaching the fifth anal ray. A narrow stripe along base of anal naked; prickles along lateral line enlarged, forming 2 series of spinelets along its anterior portion; 34 pairs of strong recurved spines along the sides of the back. Sides ashy with scattered rusty spots; a series of conspicuous purple spots below the lateral line; lower surface white; dorsal and caudal marked with rusty bars. Cortez Banks, off San Diego, California (Eigenmann); not seen by us. Type, a single well-preserved specimen, 15 mm. long, from the stomach of *Sebastodes levis*, from 48 fathoms. (*ὁπλιτικός*, armed.)

Paricelinus hopliticus, EIGENMANN & EIGENMANN, West American Scientist, Nov. 9, 1889, 131, Cortez Banks. (Coll. C. H. Eigenmann.)

705. ALCIDEA, Jordan & Evermann.

Alcidea, JORDAN & EVERMANN, new genus (*thoburni*).

Body elongate, with slender and spinous head. Branchiostegal membranes broadly united, free from the isthmus. Preopercular spines simple, 3 in number, all directed downward; a distinct slit behind last gill arch. Teeth in jaws, and on vomer and palatines. A palmate supraorbital cirrus; others present on preopercle. Nasal spine strong. Body thickly beset with short, stiff, villiform prickles; a series of plates along each side of base of dorsals, bearing each a strong spine; plates of lateral line spinous. Both dorsals and anal very long; caudal rounded; pectorals with the lower rays simple, exserted, produced; ventrals broad, I, 5. *Alcidea* differs widely from *Icelus* in the structure of its ventrals and pectorals, in the very spinous head, and in the nature of the body covering. It is, however, evidently very close to *Paricelinus*. If Dr. Eigenmann's account is correct, the two should be generically as well as specifically, distinct. Gilbert observes:

> "Our specimen seems to agree in most of its characters with Eigenmann's type of *Paricelinus*, but differs from his description in a number of important respects, which, if correctly given, would indicate specific separation for our specimen. The latter does not possess a pair of long barbels at the chin, but has others, not mentioned, above eye and along margin of preopercle. The suborbital stay does not possess 2 strong upwardly direct spines behind eye, but it is thickly beset with a number of crowded smaller spines. The maxillary is contained 3 times, not 3½, in head. A distinct slit exists behind fourth gill arch. The origin of the spinous dorsal is above middle of opercle, not over its posterior portion as stated in the description. The lower portion of pectoral fin has its rays very much exserted and somewhat produced, a point not mentioned by Eigenmann."

(*ἀλκή*, the elk, from the preopercular spine; *εἶδος*, resemblance.)

2269. ALCIDEA THOBURNI (Gilbert).

Head 3⅘; depth 7; eye 3⅔ in head; snout 3⅓. D. XIII, 19; A. 23; P. 15; V. I, 5; pores in lateral line 43 or 44; branchiostegals 6. Body very slender and elongate, the ventral line straight, the dorsal outline descending rapidly forward to the slender, sharp snout, and declining very gently backward to the comparatively short and compressed caudal peduncle. Body highest at the shoulders, compressed, everywhere deeper than wide; length of caudal peduncle ½ its length from base of last dorsal ray. Head narrow, its greatest width equaling its depth, its profile convex above the orbits. Mouth nearly horizontal, the maxillary reaching a vertical midway between front of eye and front of pupil, 2⅞ in head. Teeth cardiform, in rather broad bands on jaws, vomer, and palatines. Snout slightly greater than length of eye. Supraorbital rim greatly elevated, the interorbital space a deep narrow groove, with a pair of low, rounded, lengthwise ridges along its floor; interorbital width 3⅙ in diameter of orbit; anterior half of supraorbital rim smooth, posteriorly beset with crowded clusters of short, strong spines, occupying the upper posterior quadrant of the orbital rim; 3 of these spines, somewhat larger than the others, lie 1 on either side, the other in front of the supraorbital cirrus; upper margin of suborbital stay continuous with that of preorbital, elevated to form a thin knife-like crest, which is irregularly serrate with short spinous teeth, the anterior the largest; between this ridge and the eye lies a deep, narrow groove; a strong postocular spine directed backward, followed after an interval by 2 similar spines on occiput, the 2 series thus formed diverging backward; nasal spines very strongly developed; upper edge of the postero-temporal minutely serrated; in advance of this a series of 3 spines, parallel with the occipital series, the posterior one remote from the two anterior; opercle unarmed; preopercle with 3 simple, strong spines directed backward, the middle one on a line with suborbital stay and slightly the longest, its length ¾ diameter of pupil. Branchiostegal membranes broadly united, free from the isthmus for its entire width. Gills 3½, a distinct and comparatively long slit behind the fourth arch; gill rakers undeveloped, tubercular. Body covered with slender, short, villiform prickles, which leave only a very narrow naked strip along base of anal, and continuous over the dorsal series of plates, reaching the base of the dorsal fins; a narrow band of prickles in axil of pectorals, behind this a wide naked area extending downward and backward to behind base of ventrals, the 2 areas separated by a narrow mesial band of prickles on belly; similar prickles cover continuously the occiput, the opercles, and the portion of cheeks and preopercles which lie above suborbital stay; a narrow lengthwise band of prickles on cheek below suborbital stay, the lower side of head together with snout and inteorbital region otherwise naked; a series of 34 broad plates along each side of dorsal fins, extending from the nape to the middle of caudal peduncle; each plate transversely angulated, the outer half directed outward and downward, the inner half nearly horizontal inward, the angle bearing a very strong, compressed, backwardly hooked spine; the dorsal fins thus occupy the middle of a flat dorsal strip, bounded by the 2 series of spines; a number of enlarged spine-like prickles accompany the lateral line, each pore of which lies in the axil of one such; anteriorly, these prickles are arranged somewhat definitely in pairs, 2 to each pore, but this arrangement is lost posteriorly; a series of enlarged prickles is placed convexly at base of caudal fin; the upper unmodified rays of the pectoral fin, and all rays of dorsal and caudal fins, accompanied by series of prickles; other fins and thickened pectoral rays smooth. Body without filaments. No barbels at chin nor on mandible elsewhere. A slender tentacle, palmated at tip, above posterior portion of orbit, its length slightly less than diameter of pupil. A slender branched tentacle near base of middle and lowermost preopercular spines, and a simple one at an equal distance below them; a similar broadly palmated tentacle on cheek, behind end of maxillary, lost on 1 side in our specimen, but the scar apparent. Dorsal fins separate, the membrane from last spine joining base of first soft ray; spines very slender, the sixth the longest, $2\frac{1}{3}$ in head, very slightly shorter than the soft rays; base of spinous dorsal $1\frac{1}{6}$ in head, of soft dorsal $2\frac{3}{5}$ in length of head and body; front of anal under twelfth dorsal spine, the longest ray $\frac{1}{3}$ head, the length of the base slightly less than $\frac{1}{2}$ head and body; caudal rounded, $1\frac{3}{5}$ in head; the lower 6 pectoral rays simple, thickened, exserted, the membranes very deeply incised, the upper 3 longer than the branched rays above, the longest extending to opposite fifth anal ray; ventrals broad, the inner rays shorter than the outer, which extend to opposite second anal ray. Color in life, light olivaceous, with 4 brown cross bands, 1 under spinous dorsal, 3 under soft dorsal; a series of 9 roundish dusky spots along middle of sides below lateral line; back and sides with small golden spots and streaks; a distinct series of round blue spots above lateral line, and some scattered blue spots and blotches on back and head; iris green and dusky; spinous dorsal light green, crossed by narrow yellow lines; soft dorsal translucent, shaded with reddish and bluish; ventrals translucent, posteriorly greenish, with white pigment; pectorals translucent, the rays crossed with reddish and greenish bars, which are little conspicuous; supraorbital cirrus green; preopercular cirri white. Coast of Oregon (Gilbert); 1 specimen, 165 mm. long, dredged in 75 fathoms. (Named for Dr. Wilbur Wilson Thoburn, in recognition of his work on the *Cottidæ*.)

Paricelinus thoburni, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 432, pl. 30, coast of Oregon, in 75 fathoms, at Albatross Station 3350. (Coll. Gilbert.)

706. SCORPÆNICHTHYS, Girard.

(CABEZONES.)

Scorpænichthys, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 131 (*marmoratus*).

Body rather robust, covered with smooth, thick skin. Head large, somewhat compressed, its upper surface rugose; mouth rather large, with villiform teeth on jaws, vomer, and palatines; gill membranes broadly united, free from the isthmus; a large slit behind fourth gill; preopercular spines small, simple; spinous dorsal long, scarcely emarginate, but slightly depressed near its middle, the first 4 spines shorter than those immediately following; ventral fins large, I, 5. Size large. Pacific Ocean. A well-marked genus distinguished from its allies by its perfect ventrals. (*σκόρπιος*, *σκόρπαινα*, Scorpæna; *ἰχθύς*, fish.)

2270. SCORPÆNICHTHYS MARMORATUS (Ayres).

(CABEZON.)

Head 2⅚; depth 3⅘; eye 5½. D. XI, 18; A. 12; P. 15; V. I, 5; lateral lines (pores) 80; P. 1¼; C. 1⅔; vertebræ 15 + 21 = 36. Top of head rugose, without spines; interorbital space concave, narrower than the large eye; a fleshy flap on middle of snout, and 1 on end of maxillary; superciliary cirri large; more than ½ diameter of orbit, laciniate; upper preopercular spine short, straight, about ½ diameter of eye; suborbital stay very broad; maxillary extending to beyond eye. First 4 spines of dorsal subequal, shorter than the fifth; dorsal fins scarcely connected at base; pectorals shortish, not reaching anal; skin thick and leathery, without prickles or cirri. Larval specimens 1 to 2 inches long are smooth, silvery, and compressed, looking quite unlike the adult, the number of ventral rays readily distinguishing them from other young sculpins. Olive brown, thickly mottled with dark blotches and light spots, and reticulated with different shades of green and brown; sides with 5 irregular, dark, vertical blotches, of which 2 are under each dorsal and extend on the fins; belly livid bluish or green, reticulated with olive; the ground color exceedingly variable, ranging from cherry red to green; lips blotched with white; fins all more or less barred; flesh and membranes livid bluish, the coloration of the flesh variable, like that of *Ophiodon elongatus*. Length 30 inches. Here described from a specimen 10 inches in length, from San Francisco. Puget Sound to San Diego; very abundant; used for food, but coarse and tough. The largest of the *Cottidæ*, reaching a weight of 20 to 25 pounds. Common in the markets, but not esteemed as food. (*marmoratus*, marbled.)

Hemitripterus marmoratus, AYRES, Proc. Cal. Ac. Sci. 1854, 4, San Francisco; GIRARD, U. S. Pac. R.R. Surv., Fishes, X, 64, 1858; GÜNTHER, Cat., II, 154, 1860; JORDAN & GILBERT, Synopsis, 716, 1883.

707. CHITONOTUS, Lockington.

Chitonotus, LOCKINGTON, Proc. U. S. Nat. Mus. 1881, 141 (*megacephalus*).

Body elongate, its upper part, except along base of dorsal, covered with small, very rough scales; preopercle with a long spine armed with 3 antler-like processes above. Anal papilla of male excessively developed, with a tubular filament. First dorsal divided into 2 portions, the anterior the shorter, its front spine elevated. Lateral line armed with a series of keeled scales, toothed on the keel and on hinder margin. Other characters as in *Artedius,* the body more slender, and the scales rougher. (*χιτών*, chiton, a tunic; *νῶτος*, back.)

2271. CHITONOTUS PUGETENSIS (Steindachner).

Head 3; depth 5. D. III–VII, 15; A. 14; eye $3\frac{1}{8}$ in head; maxillary 2; first dorsal spine $1\frac{2}{3}$; pectorals $1\frac{2}{5}$; ventrals $1\frac{7}{8}$; caudal $1\frac{7}{8}$. Body moderately slender, robust anteriorly, tapering into a slender caudal peduncle; mouth large, maxillary reaching to below posterior margin of pupil; teeth in narrow villiform bands on jaws, vomer, and palatines; 2 pairs of small spines just back of eyes, and a pair at occiput; nasal spines moderate; preopercle with a large process with 3 upward-directed spines, and ending in 1 horizontal one; 3 spines below it, the upper one directed backward-downward, the 2 lower ones forward-downward; interorbital space very narrow, less than $\frac{1}{2}$ of pupil. Top of head to in front of eyes closely scaled with strongly ctenoid scales; a row of quadrate plates along lateral line, their upper and posterior edges strongly serrate, lower and anterior edges embedded, above these the back evenly covered with a belt of ctenoid scales in 5 or 6 series; a narrow space below dorsal; body below lateral line naked. First dorsal spine elongate, reaching to the base of the next to the last spine, its length quite variable, the first 3 spines separated from the rest of the fin by a deep notch, the third spine shorter than the fourth; pectorals reaching past front of anal; ventrals long and slender, inserted slightly behind base of pectoral, their tips scarcely reaching to vent. Color pale olivaceous, with indications of dark cross bars above; lower parts white; pectoral, dorsal, and caudal with dark cross bars; ventrals and anal white; tip of snout dark; a dark blotch at base of caudal. Length 6 inches. Puget Sound to San Francisco; not rare in waters of moderate depth. Here described from a specimen from Puget Sound, 4 inches in length. Specimens from off San Francisco (*megacephalus* *) have the first dorsal spine usually higher, the body more slender. These characters are variable, and specimens from the Oregon coast show various intergradations.

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* The following is a description of a specimen from off Point Reyes, typical of *Chitonotus megacephalus.* Head $2\frac{3}{4}$; depth $5\frac{1}{4}$. D. III–VII, 15; A. 15; V. I, 3; scales 38. Body fusiform; head long; eyes large, separated by a very narrow, slightly concave interorbital space; mouth large, the maxillary extending to posterior border of eye; preopercle with a strong process armed with 3 or 4 upward-directed and 1 horizontal point; below this 3 other spines; 2 or 3 spines close behind eye on each side; 2 occipital ridges, ending in spines, the space between them concave; top of head, interocular space, snout, upper part of opercle, and a narrow belt close under the eye covered with rough scales; lateral line with a series of quadrate plates, their upper and posterior edges strongly serrate, the lower and anterior edges embedded; above these the back evenly covered with smaller scales, the lower and anterior part of each scale embedded, and the upper edge strongly toothed; 5 to 8 rows of these scales; a narrow naked area at base of dorsal. Dorsal spines slender, the first usually longer than head, reaching past front of soft dorsal when depressed; the second and third spines progressively shortened; the fourth higher than third, the membrane between third and fourth deeply emarginate; second dorsal high; pectorals reaching past front of anal; ventrals to vent; anal papilla very large; no conspicuous cirri. Color pale olivaceous with darker cross bars; fins in the male blackish; ventrals and anal whitish, unmarked; eye dusky above. Length 6 inches. Off San Francisco, in deep water; taken in sweep nets (*parranzelle*) off Drake Bay and Point Reyes.

Artedius pugetensis, STEINDACHNER, Ichth. Beiträge, V, 133, pl. 14, fig. 2, 1876, Puget Sound, Fox Island near Steilacoom, Port Townsend, and San Francisco. (Coll. Steindachner.) *

Chitonotus megacephalus, LOCKINGTON, Proc. U. S. Nat. Mus. 1881, 141, off San Francisco. (Coll. W. N. Lockington.)

Icelus pugetensis, JORDAN & GILBERT, Synopsis, 692, 1883.

Icelus megacephalus, JORDAN & GILBERT, Synopsis, 692, 1883.

Chitonotus pugetensis, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 805.

708. TARANDICHTHYS, Jordan & Evermann.

Tarandichthys, JORDAN & EVERMANN, Proc. Cal. Ac. Sci. 1896, 225 (*filamentosus*).

This genus is close to *Icelinus*, from which it differs in the presence of bony plates behind the axil, and in having 1 or more of the dorsal spines produced in filaments, these specially developed in the male. Three or 4 preopercular spines, the upper one strong and widely branched. The dorsal band of plates is less complete than in *Icelinus*. Deep water of the North Pacific. (*τάρανδος*, reindeer, from the antler-like spines; *ἰχθύς*, fish.)

a. Occiput with a pit-like depression; nasal, 2 postocular, and occipital spines, strongly developed; first 2 dorsal spines filamentous in the male; postaxillary plates present; dorsal series of plates scarcely reaching end of soft dorsal. CAVIFRONS, 2272.

aa. Occiput with no pit-like depression.
  b. First 2 dorsal spines filamentous, about equally produced; dorsal series of plates much longer than head, reaching end of soft dorsal; postaxillary plates present; nasal filament present. FILAMENTOSUS, 2273.
  bb. First dorsal spine filamentous, the second little, if at all, produced; dorsal series of plates usually shorter than head, not reaching middle of soft dorsal; no nasal filament; postaxillary plates present. TENUIS, 2274.

2272. TARANDICHTHYS CAVIFRONS (Gilbert).

Head 2¾ to 3; depth 4½; eye 3½ in head; snout 3½. D. X, 14 or 15; A. 12 or 13; lateral line 38. Body not slender; depth of caudal peduncle about ⅓ its length. Mouth small; maxillary reaching but little beyond front of pupil, 2¾ to 3 in head; interorbital space narrow, groove-like, its width ½ diameter of pupil; nasal spines very strong, more than ½ width of pupil, without filament; supraorbital ridge ending above posterior margin of orbit in a strong spine as large as that on nasal bone; by the side of this, behind the eye, another equally strong; behind these spines the outline is suddenly broken by a deep circular pit, as large as pupil, bounded laterally and posteriorly by the short occipital ridges; occipital spines strong; supraorbital flap well developed; no other conspicuous filaments in our specimens; upper preopercular spine strong, ⅔ diameter of orbit, with 1 process directed backward and 3 to 5 upward, the usual 3 spines below this; a spinous point at lower angle of subopercle, and a short spine on shoulder. Dorsal series of scales rather short, longer than head, extending from opposite fifth dorsal spine to base of third to last ray of soft dorsal, this series usually becoming single for a short distance posteriorly, and containing about 19 in a series; a few scattered spinous plates behind axil of pectorals; the 2 anterior dorsal spines filamentous in males, not elevated in females, in our specimens extending, when elevated, to middle of soft dorsal. Ground color varying with surroundings from olivaceous to bright coral red; a broad black bar below eye, and 4 across back; 1 under spinous dorsal, 2 under soft dorsal, and 1 across caudal peduncle; belly white, the dark bars encroaching on region below lateral line; males darker than females, with black punctulations covering sides and below; the branchiostegal membranes, the lower $\frac{2}{3}$ of pectorals, the ventrals, and anal black; spinous dorsal irregularly blotched or mottled with black; soft dorsal, caudal, and terminal portion of pectorals (in females) with dark cross bars. Length $3\frac{1}{2}$ inches. Coast of southern California; numerous specimens obtained by the *Albatross* in 44 and 30 fathoms. (Gilbert.) (*cavus*, concave; *frons*, forehead.)

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* "Kommt in sehr grosser Menge im Puget Sunde bei der Fox Insel, nächst Steilacoom, bei Port Townsend, viel seltener bei San Francisco vor und laicht im October an seichten sandigen Uberstellen." (Steindachner).

Icelinus cavifrons, GILBERT, Proc. U. S. Nat. Mus. 1890, 83, off Santa Barbara Islands, at Albatross Stations 2907 and 2945, in 44 and 30 fathoms. (Type No. 44405.)

2273. TARANDICHTHYS FILAMENTOSUS (Gilbert).

Head $2\frac{6}{7}$; depth $4\frac{1}{3}$ to $4\frac{3}{4}$; eye $4\frac{3}{4}$ in head. D. X–16 or 17; A. 14 or 15. Body shaped as in *Icelinus quadriseriatus*, but heavier; caudal peduncle $\frac{2}{3}$ diameter of orbit; mouth small, maxillary not reaching vertical from middle of pupil, $2\frac{3}{4}$ in head. Teeth in broad bands on jaws, vomer, and palatines. Interorbital space not narrow, grooved, its width more than $\frac{1}{2}$ diameter of orbit; preopercular spine strong, $\frac{3}{4}$ diameter of orbit, with a short terminal point and 3 or 4 strong upwardly directed barbs, curved slightly forward; below this 3 short simple spines directed downward, and downward and forward; nasal spines strong, occiput with a broadly rounded ridge, ending behind in a rather blunt point; no pit behind eyes; no other spines on head. Gill membranes broadly joined, free from isthmus. A simple slender filament at base of nasal spine, a conspicuous one on tip of maxillary, 2 on occipital ridge, 3 on preopercular margin, an inconspicuous one near base of opercular flap; a large black supraocular flap, about as long as diameter of pupil. Body armed essentially as in *quadriseriatus;* the upper series of plates double throughout, beginning under third or fourth dorsal spine and terminating under last dorsal ray, 28 or 30 in each series; 36 or 37 plates in lateral line, their posterior borders occasionally with a slender white filament; axil of pectoral with from 2 to 6 half-embedded spinous plates; skin otherwise smooth. Fins large, the spinous dorsal with the first 2 rays produced into long slender filaments, which reach beyond middle of soft dorsal, and are much longer than head, the membrane between these not incised, and they are not separated from rest of fin; dorsals not connected, the longest ray of soft dorsal nearly $\frac{1}{3}$ head; pectorals not long, $1\frac{1}{3}$ to $1\frac{1}{2}$ in head; ventrals about $\frac{1}{5}$ head. Olivaceous above, white below; a distant black blotch under spinous dorsal, 1 or 2 diffuse blotches under soft dorsal and several along lateral line; below lateral line an irregular series of small pearly spots, most distinct anteriorly; a dark bar vertically crossing cheek; gill membranes dusky; pectorals black at base and on lower rays, upper part white, with 2 irregular cross bars; ventrals dusky; anal white, margined with black; caudal with a dusky cross bar at base and tip, mesially white; dorsals translucent, narrowly edged with black, and with narrow oblique, somewhat irregular, dusky cross bars. Length 9 inches. Coast of southern California; several specimens obtained by the *Albatross* in 145 and 55 fathoms. (Gilbert.) (*filamentosus*, thread-like.)

Icelinus filamentosus, GILBERT, Proc. U. S. Nat. Mus. 1890, 85, off Santa Barbara Islands at Albatross Stations 2893 and 2959, in 145 and 55 fathoms. (Type, No. 44407.)
Tarandichthys filamentosus, JORDAN, Proc. Cal. Ac. Sci. 1896, 225, pl. 28.

2274. TARANDICHTHYS TENUIS (Gilbert).

Head 3¼ to 3⅗; depth 5⅕ to 5½; eye 3¼ to 3⅗ in head. D. X–17 to 19; A. 15 to 17. Body slender, tapering into a very slender caudal peduncle, whose depth is less than ⅓ its length, and ½ diameter of orbit. Eye large, longer than snout; maxillary reaching slightly beyond middle of orbit, 2⅕ in head. Bands of teeth narrower than usual, present on jaws, vomer, and palatines. Interorbital space narrow, ½ diameter of pupil, slightly concave posteriorly, the ridges converging anteriorly and meeting above front of pupil; upper preopercular spine smaller, about as long as pupil, with a short terminal process, and 2 or 3 upwardly directed ones; below this a simple spine directed backward, and 2 directed downward and forward; nasal spines strong; 2 strong spines behind upper edge of orbit, and a single sharp one at end of occipital ridge; occipital region gently concave; no pit behind eyes; no spine on opercle or suborbital, and no distinct spine on shoulder; a simple black flap on upper rim of orbit posteriorly; no other flaps on head, and usually none on plates of lateral line; plates of lateral line as in related species, 41 in number; dorsal series of plates arranged in a double row as usual, but very short, beginning under fifth dorsal spine and ending under first third of soft dorsal, its length varying from slightly longer than head to ⅔ its length, double throughout; sides immediately behind axil of pectorals with about 15 plates similar to those of lateral line, but smaller, scattered or showing a tendency to regular arrangement; first ray of spinous dorsal very slender, filamentous, varying in length, in adults reaching end of soft dorsal, the second spine sometimes sligtly produced, but never long; the 2 dorsals entirely disconnected, the height of soft dorsal ½ or ⅗ length of head; pectorals long in males, reaching much beyond front of anal, as long as head; ventrals nearly ¾ orbit. Color light olivaceous above, white below, the back with 4 black crossbars, the first under spinous dorsal, the second and third under anterior and posterior parts of soft dorsal, the fourth at base of caudal; back and sides, including head, with pearly dots and lines; those on upper parts frequently curved and margined with dark; spinous dorsal with a small dark blotch posteriorly, and some dusky markings; soft dorsal translucent, with broad oblique dusky bars; caudal with the dusky basal bar continued on upper and lower rays at base, the basal half of fin translucent, its terminal portion with 2 or 3 blackish crossbars; anal black-edged in males; ventral black in males; base and lower half of pectorals largely black in males, the terminal portion with pearly and dusky bars; branchiostegal membranes black in males; a broad black bar below eye. Length 5½ inches. Coast of southern California, in rather deep water. (Gilbert.) (*tenuis*, slender.)

Icelinus tenuis, GILBERT, Proc. U. S. Nat. Mus. 1890, 86, off Santa Barbara Islands, at Albatross Stations 2893, 2946, 2959, 2977, and 2983, in 45 to 150 fathoms. (Type, No. 43086. Coll. Gilbert.)

709. ICELINUS, Jordan.

Icelinus, JORDAN, Cat. Fishes N. A., 110, 1885 (*quadriseriatus*).

Body slender, little compressed; upper preopercular spine long, with 2 to 5 hooked processes above; a well developed series of spinous scales or plates along the back, these meeting behind dorsal; another series along lateral line; no plates behind the axil. Three or 4 preopercular spines. No slit behind last gill; gill membranes broadly united, free from the isthmus. Teeth on vomer and palatines; spinous dorsal short, without notch or filaments; ventral fins small, I, 3. Deep waters off the coast of California. Size small. (Name a diminutive from *Icelus*, Ἴκελος, a god of sleep, from the quiescent habit of these Northern fishes.)

a. Nasal tentacle broad and palmate, with narrow stem-like base; nasal, 2 postocular and occipital spine present; interocular space about ½ pupil; supraocular filament usually fimbriate. Head 2½ in length. . FIMBRIATUS, 2275.

aa. Nasal tentacle simple, slender. Eye very large; interocular space very narrow, about ¼ pupil; maxillary reaching posterior border of pupil; no postocular or occipital spines.

b. Preopercular spine moderate, shorter than eye; head 2½ in length; eye large, 3⅗ in head. OCULATUS, 2276.

bb. Preopercular spine large, as long as eye; head 2¾ in length; eye small, 4 in head.
BOREALIS, 2277.

aaa. Nasal tentacle obsolete.

c. Head small, ⅓ length; interocular space 2½ in pupil; dorsal series of plates usually interrupted under posterior rays of soft dorsal, then continued on back of caudal peduncle; no postocular spine; nasal and occipital spines present. QUADRISERIATUS, 2278.

cc. Head larger, 2¾ in length; dorsal series of plates continuous, the series double, except for last 5 or 6 scales; a short dermal flap behind eye.
STRABO, 2279.

2275. ICELINUS FIMBRIATUS, Gilbert.

Head 2½ to 2⅔; depth 4¾; eye 3⅚ to 4¼ in head. D. X, 15 or 16; A. 12. Shape much as in *Icelinus quadriseriatus*. Depth of caudal peduncle ⅔ orbit. Mouth larger, the maxillary reaching beyond middle of pupil, 2⅓ to 2½ in head; teeth as usual; nasal spines strong; interorbital space narrow, grooved, ½ length of pupil; preopercular spine very heavy, slightly more than ½ orbit, with a terminal tooth, and 3 upwardly directed processes; 2 blunt spines behind eye, and another at end of occipital ridge; 3 preopercular spines below the main one; no distinct spines on opercle or shoulder; a spine at lower angle of subopercle; conspicuous, palmate tentacles on nasal spines and above and behind eye; besides these, a number of simple or divided filaments on eyeball, occiput, preorbital, maxillary, preopercle, and along lateral line, the latter mostly in groups of 3 to 5; plates on side as in related species, 36 to 38 along lateral line, 32 in upper dorsal series; the dorsal series becoming single behind dorsal fin, double elsewhere, beginning between third and fourth dorsal spines; no plates in axil; none of the dorsal spines filamentous, the middle ones the longest, the soft rays still higher; dorsal fins wholly separate; ventrals small, about ⅔ diameter of orbit; pectorals short, about ½ head. Color olivaceous above, with about 4 irregular black bars; white below; middle of sides black, with larger or smaller roundish white spots; lips black, crossed by narrow white streaks; branchiostegal membranes blackish; ventrals white, other fins all crossed with oblique or vertical black bars; spinous dorsal largely black anteriorly and at tips of posterior spines; pectorals largely black on basal portion of lower rays; barbels white, except the supraocular, which are black. Length 5½ inches. Off southern California, in rather deep water. (Gilbert.) (*fimbriatus*, fringed.)

Icelinus fimbriatus, GILBERT, Proc. U. S. Nat. Mus. 1890, 87, off Santa Barbara Islands, at Albatross Stations 2893 and 2975, in 145 and 36 fathoms. (Type, No. 43087. Coll. Gilbert.)

2276. ICELINUS OCULATUS, Gilbert.

Head long, 2⅔; depth 5¼; eye 3⅗ in head; snout 3⅗. D. X, 15; A, 14; lateral line 39. Body elongate, tapering rapidly backward to the very slender caudal peduncle, whose least depth is 2½ in its length; lower profile straight; head sharp anteriorly, the occipital ridge blunt, the included space gently concave, not pit-like; eye very large; interorbital space very narrow, slightly concave posteriorly, with a median ridge in front, very strongly expanding over front of eye, its width $\frac{2}{7}$ pupil; mouth large, extending beyond vertical from pupil, 2¼ in head; teeth in rather narrow bands in jaws and on vomer and palatines; preopercular spine rather small, in the single specimen known, bifid at tip and with 2 strong antler-like processes directed upward, the number varying in all known species, and probably normally greater than 2 in this species; below this, a weak spinous projection directed backward, and 2 stronger ones downward and forward; a spinous point at lower angle of subopercle, none on occiput, shoulder, or opercle; branchiostegal membranes, gill rakers, and armature of side as usual, the dorsal series of plates unusually well developed, extending from opposite second dorsal spine to beyond second dorsal, where the series becomes single, those of the two sides closely approximated; no scattered plates behind pectorals; an elongate, simple supraorbital flap, a filament in connection with nasal spine, 2 on occipital ridge, and 1 on maxillary; a few filaments on plates of lateral line; none of the dorsal spines elevated; pectorals reaching slightly beyond origin of anal. Color as in *T. tenuis,* but the light spots on upper parts of body not elongate, and not dark margined; no conspicuous dark bar below orbit; anal fin translucent in the specimen here described, a female. Length 5½ inches. Southern California; 1 specimen known. (Gilbert.) (*oculatus,* large-eyed.)

Icelinus oculatus, GILBERT, Proc. U. S. Nat. Mus. 1890, 88, off Santa Barbara Islands at Albatross Station 2935, in 124 fathoms. (Coll. Gilbert.)

2277. ICELINUS BOREALIS, Gilbert.

Head 2¾; depth 4¾ to 5½; eye 4 in head. D. IX or X, 16; A. 13 or 14; P. 16; lateral line 39. Very similar to *Icelinus oculatus,* but differing in the large size of the preopercular spine, the smaller, less elliptical eye, the wider interorbital space, less abruptly expanding anteriorly, the lower occipital ridges, and in the much smaller size. Body slender, tapering rapidly backward to caudal peduncle, whose least depth is 3¾ to 4¼ in its length; head long, smaller than in *Icelinus oculatus;* occipital ridges blunt, the included space gently concave, not pit-like; interorbital space wider than in *Icelinus oculatus,* not distinctly concave, the median ridge very faint, the width about 4 in eye (in *oculatus* about 10 in eye); supraocular and occipital ridges rugose or minutely pitted; 2 conspicuous mucous pores behind each eye, the anterior margins often elevated to form a spinous projection; mouth large, extending beyond vertical from pupil, 2¼ in head; teeth in narrow bands on jaws, vomer, and palatines; the 2 anterior pores on mandible open together at symphysis as in all the other species of the genus except *Icelinus oculatus,* where they open separately, on either side of the symphysis; preopercular spine large, about as large as eye, with 3 antler-like processes directed upward; below this a weak, spinous projection directed backward (wanting in many specimens), and 2 stronger ones downward and forward; a spinous point at the lower angle of subopercle; an indistinct spine terminating in occipital ridge; armature of sides as in *Icelinus oculatus,* the dorsal series of plates extending continuously onto the back of caudal peduncle; no scattered plates behind pectorals; a large, rather broad supraorbital flap, bifid or trifid, or occasionally with more than 3 terminal filaments; the height of flap equals or slightly exceeds diameter of pupil; a white filament near tip of maxillary; 2 pairs on occipital ridges; 1, not wholly constant, on cheek overlying suborbital stay; a few scattered ones accompanying plates of lateral line; none of the dorsal spines elevated; pectoral fins reaching slightly beyond origin of anal. Color olivaceous above, sides of head and body vermiculated and blotched with olive brown, especially along middle of sides; white below nearly to lateral line; the back with 4 black cross bars as in *Icelinus oculatus*; a dark blotch on cheek, and a dark streak forward from eye; membrane between first 2 spines of first dorsal dark; usually a black terminal bar posteriorly; second dorsal, pectorals, and caudal with faint oblique bars; no dusky patch at base of pectoral; anal translucent. Length 2½ feet. Aleutian Islands, coast of

Alaska;* numerous specimens taken both north and south of the Aleutian Islands and in Bristol Bay, in 38 to 59 fathoms. (Gilbert.) (*borealis*, northern.)

Icelinus borealis, GILBERT, Rept. U. S. Fish. Comm. 1893 (1896), 415, pl. 25, Aleutian Islands and Bristol Bay, at Albatross Stations 3213, 3214, and others, in 11 to 121 fathoms.

2278. ICELINUS QUADRISERIATUS (Lockington).

Head 3⅓; depth 5½. D. VIII, 13; A. 12; V. I, 3. Body slender, little compressed, tapering from the shoulders to the slender tail; mouth moderate, the maxillary reaching about to middle of pupil; a pair of ridges on the occiput, each ending in a spine, the space between them concave; interocular space very narrow, grooved; upper preopercular spine very long, armed with about 5 hooks, all but 1 directed upward; below this 3 simple spines; head naked or very nearly so, with conspicuous mucous pores above and a few minute cirri; dorsal fins separated; pectorals broad, about reaching anal; ventrals very small; lateral line with a series of spinous plates; above it along the back a double series of spinous plates placed at an angle, the upper plates with the free edge downward and backward, the lower plates with the free edge upward and backward, this band composed of a single series before and behind, and not extending around the dorsal in front; skin otherwise perfectly smooth. Pale olivaceous, somewhat mottled; lateral line with dark blotches; branchiostegal region black in the males; a black bar at base of caudal; a black spot at front of spinous dorsal, and 1 at tip of the last spine; pectorals with a dark spot at base; other fins olivaceous, little variegated. Length 3 inches. Coast of California, in water of moderate depth; locally very abundant, great numbers being sometimes taken in the sweep nets between Point Reyes and the Golden Gate. (*quadriseriatus*, four-rowed.)

Artedius quadriseriatus, LOCKINGTON, Proc. U. S. Nat. Mus. 1879, 330, off San Francisco. (Type, No. 23503. Coll. Lockington.)

Icelus quadriseriatus, JORDAN & GILBERT, Synopsis, 691, 1883.

Icelinus quadriseriatus, GILBERT, Proc. U. S. Nat. Mus. 1890, 83; JORDAN, Proc. Cal. Ac. Sci. 1896, 225, pl. 29.

2279. ICELINUS STRABO, Starks.

Head 2¾ in body; depth 4. D. IX-15; A. 13; eye 4 in head; maxillary 2⅖; snout 4. Body robust at shoulders, tapering into a rather slender caudal peduncle; upper profile of head evenly curved from snout to dorsal, the snout rather steep; mouth horizontal and placed at the extreme lower aspect of head; upper jaw projecting slightly beyond the lower; narrow bands of villiform teeth on jaws, vomer, and palatines; maxillary reaching about to posterior margin of eye. Nasal spines prominent; upper spine of preopercle longer than eye, extending upward and backward, and bearing on its inner edge 1 or 2 antler-like processes; below it on edge of preopercle are 2 small spines, the upper rather blunt and not conspicuous, the lower longer and sharp, pointing downward and somewhat forward; on each side of occiput is a small blunt tubercle, a short dermal flap behind each eye, and 1 sometimes present behind each occipital tubercle; head naked; a band of scales along back, following dorsal outline, composed of 2 rows of scales for most of its length, but the posterior 5 or 6 scales are in a single row; the outer and anterior edge of each scale embedded, the inner and posterior edge strongly ctenoid, so the opposing edges of the rows are ctenoid edges; a single row of 37 scales along lateral line, the anterior ones rougher than the others. Dorsal spines slender, the fins not connected; front of anal slightly nearer tip of snout than base of caudal; pectorals rather wide, reaching a little past front of soft dorsal. Color olive gray, with faint irregular darker cross bars on back, the first under middle of spinous dorsal, the second under first fourth of soft dorsal, the third under last fourth of soft dorsals, indications of 1 on caudal peduncle, and a dark streak at base of caudal fin; sides and back mottled, under parts white; ventrals and anal white, other fins crossed with dark wavy lines. This species is closely related to *Icelinus borealis*, differing from it in having a smaller eye, a stouter caudal peduncle, a slightly wider interorbital space, shorter barbels behind eye, the barbels at occiput not so constant in their presence, and in having the end of maxillary in a different relation to the eye. The eye of *Icelinus borealis* is contained only 3 times in the length of the head in specimens of the same size as *Icelinus strabo* and the maxillary scarcely reaches past pupil. This comparison is based on specimens of *I. borealis* taken by the *Albatross* in the Straits of Fuca and in Bristol Bay, Alaska. Puget Sound, at Port Ludlow, Washington, where many specimens were obtained in 1896 by Mr. Starks. (στραβῶν, squint-eyed.)

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* "It is impossible to compare this or any other described species of *Icelinus* with *Icelinus australis*, Eigenmann, described from partially digested specimens. From Eigenmann's description of the preopercular spine, it is even doubtful whether that species is a member of the genus *Icelinus*." (Gilbert.)

Icelinus strabo, STARKS, Proc. Cal. Ac. Sci., series 2, Vol. VI, 1896, 551, Port Ludlow, Washington. (Type, No. 5451, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

710. ASTROLYTES, Jordan & Starks.

Astrolytes, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 807 (*fenestralis*).

This genus is close to *Artedius*, with which it agrees in most respects, differing in the presence of stellate scales on top of head, in the concave interorbital area, the rough vertex, and in the form of the large preopercular spine, which is bifid at tip with 1 antler-like process or hook above. The mouth is smaller than in *Artedius*, the ventrals longer, the band of scales on back more developed and the nasal spines larger. There is sometimes a small pore behind fourth gill arch. Shore fishes of the North Pacific. (ἄστρον, star; λυτήρ, releaser.)

a. Edge of preopercle below with blunt serrated processes below the spine; band of scales not meeting its fellow behind dorsal fin; dorsal rays IX, 15.
NOTOSPILOTUS, 2280.

aa. Edge of preopercle below spine with processes entire, covered by skin; band of scales meeting its fellow behind dorsal fin; dorsal rays IX, 17.
FENESTRALIS, 2281.

2280. ASTROLYTES NOTOSPILOTUS (Girard).

Head 2¾; depth 4¾; eye 4⅔ in head. D. IX, 15; A. 11 or 12; scales about 44. Head short and broad, its vertex depressed; nuchal region with a cross ridge, in front of which is a quadrate depression; 2 blunt tubercles behind each eye, armed at tip with small spines; behind these 2 others without spines, on the occipital ridges; each of these spines with a small cirrus; a small cirrus above posterior part of eye; a minute one on the maxillary; interorbital space deeply concave, the supraocular ridges elevated. Mouth moderate, broad, the maxillary extending to beyond the pupil, its length nearly ½ that of the head; suborbital stay strong; preopercle with a strong process, bifid at tip, and with 1 or more upward-directed spines; below this 3 blunt serrated processes or multified spines; vertex, temporal region, interorbital space, and opercles covered with small, detached, stellate scales, strongly spinous at their edges; these smaller than the scales of the dorsal band. Olivaceous, often tinged with purplish, and much variegated; a black bar at occiput; another from middle of spinous dorsal to the axil; 1 under front of second dorsal extending obliquely forward; 1 under posterior part of second dorsal; 1 on caudal peduncle; bars and interspaces everywhere finely reticulated and mottled; lower parts dusky, with brassy tinge, often with dark reticulations around whitish spots; branchiostegals blackish, with yellow tinge; fins all variegated, the lower fins generally dusky; a black spot ocellated with orange between first and second dorsal spines, sometimes a duller one between third and fourth; a large black spot between sixth and eighth spines. Length 10 inches. Coast of California, from Cape Mendocino southward; abundant off Santa Barbara. Here described from specimens from Santa Barbara. (νῶτος, back; σπιλωτός, spotted.)

Calycilepidotus lateralis, AYRES, Proc. Cal. Ac. Sci. 1855, 77; not of GIRARD.

Artedius notospilotus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 134, Tomales Bay (Types, Nos. 329 and 367. Coll. E. Samuels and Dr. W. O. Ayres); GIRARD, U. S. Pac. R. R. Surv., X, Fishes. 71, 1858; GÜNTHER, Cat., II, 174, 1860.

Icelus notospilotus, JORDAN & GILBERT, Synopsis, 690, 1883.

2281. ASTROLYTES FENESTRALIS (Jordan & Gilbert).

Head 2⅘; depth 4⅓; eye 5 in head. D. IX, 17; A. 12; lateral line 36. General form of *Astrolytes notospilotus*. Body rather robust; head large and broad; lower jaw included; maxillary extending to posterior part of eye, 2⅕ in head; eye rather large, about ⅓ broader than the concave interorbital space; nasal spines strong, with a conspicuous cirrus behind them; top of head less depressed and less concave than in *A. notospilotus*, its lateral ridges smooth and covered by skin, without spine-like projections; no tubercular prominences behind eye; preopercle ending in a short process, which has usually 3 spines at its tip, the 2 uppermost hooked upward; the 3 prominences below this spine small, entire, covered with smooth skin. (In *A. notospilotus* these projections are much larger, and more or less coarsely serrate.) A few small dermal flaps on top and sides of head; head with small stellate, nonimbricate scales, arranged much as in *A. notospilotus*, but extending lower on sides of head, covering suborbital and postorbital regions, as far down as suborbital stay. Scales on body cup-shaped, arranged, as in *A. notospilotus*, in a broad band along each side of back; each band about 9 scales in breadth; this band extending much farther back than in *A. notospilotus*, meeting its fellow across the back of tail behind dorsal fin; a small, but distinct, pore-like slit behind the fourth gill (wholly wanting in *A. notospilotus*). Fins low, the dorsal much lower than in *A. notospilotus;* the longest dorsal spine about equal to snout, 3½ in head (in the female), probably higher in males; ventrals about reaching vent; pectorals past front of anal. Color in spirits, essentially as in *A. notospilotus*, but paler; olivaceous, the head mottled and barred with blackish; back with about 4 saddle-like black bars; base of caudal blackish; fins all, except the ventrals, which are pale (probably dusky in males), with cross bars and series of spots; a black blotch bordered by orange between first and second dorsal spines, and another between seventh and eighth. Length 5 inches. Puget Sound; locally common. (*fenestralis*, with a window, from the small gill pore.)

Artedius fenestralis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 577, Puget Sound (Type, No. 27206, U. S. Nat. Mus. Coll. Jordan & Gilbert); JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 807.

711. ARCHISTES, Jordan & Gilbert, new genus.

Archistes, JORDAN & GILBERT, Fishes of Bering Sea, in Rept. Fur Seal Investigations for 1896, 1897 MS. (*plumarius*).

Head and body compressed; lateral line armed with a series of spinous plates; a series of smaller similar plates along base of dorsal widening anteriorly so as to fill the space between dorsal and lateral line, but not extending around front of dorsal to connect with band on the other side. Head naked; gill membranes broadly united, free from the isthmus; no slit or pore behind last gill; no spines above eye or on vertex; a single gently curved preopercular spine, not forked and without cusps or processes; a large fringed supraorbital flap; small flaps and cirri on occiput, sides of head. and along lateral line; teeth on jaws, vomer, and palatines; dorsals continuous, notched between spinous and soft portions; ventrals I, 3, without setæ; vent far forward, immediately behind base of ventral fins, the male with a long anal papilla. (*ἄρχος*, vent; alluding to its unusual position.)

2282. ARCHISTES PLUMARIUS, Jordan & Gilbert.

Head 3⅗ in length; depth 4; eye 3½ in head. D. X, 23; A. 18; P. 15 or 16. Anterior portion of head compressed and narrow, with vertical sides, the width at angle of mouth little greater than diameter of orbit. From the ocular region the head widens rapidly backward and downward to preopercular spine, leaving the occiput narrow; greatest width of head and body near preopercular spine, slightly less than depth of head at occiput;

body compressed, everywhere much deeper than wide. Mouth slightly oblique, maxillary reaching slightly beyond vertical from front of pupil, $3\frac{1}{5}$ in head. Jaws and vomer with rather wide bands of uniform fine teeth; a small patch on front of palatines; nasal spines strong, fixed; preopercular spine strong, simple, directed upward and backward, gently curved; preocular margin without further spines or prominences. Opercle thin, without rib or spine; supraocular rim elevated, projecting above profile of head; interorbital space narrow, deeply channeled, the sides sloping convexly; occiput depressed behind the eyes and transversely rounded, rendering the profile somewhat concave; posteriorly the occiput rises and is literally angulated, somewhat quadrate therefore in cross section; vertex without ridges or spines; supraocular flap as long as eye, lanceolate in form, coarsely fringed along the margins; a pair of broad, deeply cleft flaps near middle of occiput, and a second pair at posterior edge of occiput; a long nasal cirrus, a series of short filaments along margin of preopercle, 1 on suborbital stay, 1 near tip of maxillary, a cleft filament near opercular angle, and a series of 4 filaments along middle of lateral line; anterior nostrils in a short tube; gill membranes widely joined across the throat, entirely free from isthmus. Lateral line rising in a high convex curve anteriorly, the curved and straight portions equal; along its course is a series of 44 plates, with the upper edge free and spinous, large along the curved portion of the line, but diminishing rapidly in size posteriorly, the free edge becoming smooth or nearly so; a series of much smaller but similar plates lies along base of dorsal, extending halfway along back of caudal peduncle, widening under anterior half of spinous dorsal to form a band which nearly fills the space between dorsal and lateral line; skin otherwise entirely naked. Dorsal beginning a pupil's diameter behind occiput. Spines very slender, the anterior ones highest, each crowned with a membranaceous flap which is digitately cleft; the third spine longest, $\frac{1}{2}$ length of head; the last spine about $\frac{2}{5}$ the third and $\frac{1}{2}$ the succeeding short ray; pectoral rays all simple, the lower thickened with incised membranes, the longest rays reaching vertical from third anal ray; ventrals narrow, reaching front of anal when declined; vent immediately behind ventral fins, the long anal papilla reaching front of anal fin when declined. Color in spirits, light grayish olive, a series of 5 irregular quadrate blotches along the back, usually connected at their lower margins; middle of sides with dusky marblings, from the lower edge of which a series of 7 V-shaped black blotches descend toward lower outline; the dusky marking of sides inclosing small round spots of ground color; an oblique dark bar on snout and a black blotch on lower portions of cheek; interopercle and upper branchiostegals with cross series of black spots; pectoral with a large dark blotch and indistinct cross bars on the rays; anal crossed by oblique dark bars; caudal indistinctly cross-barred; dorsals dusky, without definite pattern; ventrals plain. Length 3 inches. Ushishir Island, of the Kuril Group; only the type known. (*plumarius*, feathery.)

Archistes plumarius, JORDAN & GILBERT, Fishes of Bering Sea, in Rept. Fur Seal Invest. 1896, 1897 MS., Ushishir Island. (Type, in U. S. Nat. Mus. Coll. Jordan.)

712. ARTEDIUS, Girard.

Artedius, GIRARD, Proc. Ac. Nat. Sci. Phila., VIII, 1856, 134 (*lateralis*).

Body broad and depressed anteriorly, compressed toward caudal, with a broad band of rounded scales along side of back, not extending on head and not meeting behind dorsal; no plates at base of dorsal; head large, depressed, naked above, the interorbital space narrow and flat; preopercle with a moderate bifid spine; nasal spines small; mouth large, cleft, the lower jaw included; teeth on jaws, vomer, and palatines; gill membranes broadly united, free from isthmus; branchiostegals 5; no slit behind last gill; dorsal fins separated; ventrals short. Shore fishes of the Pacific coast of America. (Named for Petrus Artedi, the associate of Linnæus, called the "Father of Ichthyology," in "memory of an ichthyologist whose works prepared the road toward a clear and concise zoological nomenclature.")

a. Dorsal band of scales narrow, of 8 rows anteriorly, and 2 or 3 posteriorly. LATERALIS, 2283.

aa. Dorsal band of scales wider, of 9 rows anteriorly. ASPERULUS, 2284.

2283. ARTEDIUS LATERALIS (Girard).

Head $2\frac{3}{4}$; depth 5. D. IX–16; A. 13; V. I, 3; scales about 28 in longitudinal series. Body rather slender, a little compressed; head long and low, less deep than in the other species; occipital region almost flat; interocular space much narrower than the eye; eye shorter than snout, nearly 5 in head; skin of head everywhere perfectly smooth, its upper surface with numerous small conspicuous pores, and many slender small cirri; no distinct supraorbital cirrus, and no occipital ridges; nasal spines small; mouth very large, the jaws nearly equal, the maxillary extending to below the posterior edge of the eye, its length about $\frac{1}{2}$ that of the head; preopercular spine very small, covered with the skin, forked at tip; dorsal band of scales narrow, of about 8 rows anteriorly, 2 or 3 posteriorly. Lateral line anteriorly, with small cirri; dorsal spines very slender, the first 2 shorter than the others; pectorals reaching front of anal. Dark clear olive green; head reddish shaded, the back with sharply defined cross blotches, alternately dark olive and pale; lower half of sides usually with numerous small pale spots; belly bluish; fins barred with different shades of olive, reddish brown, and black; northern specimens with a black spot on the front of the spinous dorsal; below it a scarlet crescent, bordered with yellow. Length 5 inches. Pacific coast of North America, from Puget Sound to San Luis Obispo, in rock pools; not common. Here described from specimens from Monterey. (*lateralis*, pertaining to the side.)

Scorpænichthys lateralis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 145. (Types, Nos. 328, San Luis Obispo, Coll. Lieut. Trowbridge; and 366, San Francisco, Coll. Dr. W. O. Ayres.)

Artedius lateralis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 134; GIRARD, U. S. Pac. R. R. Surv., X, Fishes, 70, pl. 22a, figs. 5 and 6, 1858; GÜNTHER, Cat., II, 174, 1860.

2284. ARTEDIUS ASPERULUS, Starks.

Head 2¾; depth 4. D. IX–16; A. 12; eye 4 in head; maxillary 2⅓; snout 4. Profile of head broadly rounded from tip of snout to occiput, the snout very steep; lower outline of head nearly horizontal, mouth at lower aspect of head little, if any, oblique; maxillary reaching to below middle of eye; villiform teeth on jaws, vomer, and palatines; nasal spines prominent, preopercular process short, bifurcate, the entire spine covered with skin, 3 small spines developed on edge of preopercle below it; top of head naked, with many mucous pores; interorbital space narrow, concave, its width about ½ eye; a wide band of strongly ctenoid scales along back, starting opposite front of spinous dorsal, and below it a distance equal to pupil, gradually running upward and nearly touching the base of soft dorsal, joining its fellow of the opposite side behind dorsal, and continuing on caudal peduncle to midway between last ray of dorsal and base of caudal; at its widest part, under front of soft dorsal, it is 9 scales wide in an oblique series; 33 oblique series in its length; lateral line armed with 35 ctenoid scales in a single series; all the scales embedded on their lower anterior edges and ctenoid on their upper posterior edges; naked area between lateral line and band of scales, at its widest part narrower than band of scales; spinous dorsal rounded in outline, not joined to soft dorsal; pectoral reaching to base of seventh or eighth ray of soft dorsal; ventrals reaching vent. Color olive brown, with 4 or 5 dark irregular cross bars on back, which break up and form reticulations around white spots on sides, the lower of these spots forming semicircles only where they run into the white of the belly, the first cross bar under front of spinous dorsal, the second under front of soft dorsal, the third under posterior third of soft dorsal, and the fourth indicated by a blotch on caudal peduncle; a dark streak at base of caudal fin; under parts white; ventrals and anal white, other fins crossed with undulating lines; lips dusky. This species differs from *Artedius lateralis,* with which it seems to be most closely related, in having a wider and longer band of scales, and in other less important characters. Length 1½ inches. Puget Sound, in the vicinity of Port Ludlow, Washington, where 3 specimens were obtained in 1896 by Mr. Starks. (*asperulus,* somewhat rough.)

Artedius asperulus, STARKS, Proc. Cal. Ac. Sci., series 2, Vol. VI, 1896, 553, Port Ludlow, Washington. (Type, No. 5046, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

713. AXYRIAS, Starks.

Axyrias, STARKS, Proc. Cal. Ac. Sci., series 2, Vol. VI, 1896, 554 (*harringtoni*).

Top of head with patches of ctenoid scales and cirri; a band of very small scales below dorsals, and a single row of larger ones following the lateral line; villiform teeth on jaws, vomer, and palatines; preopercular spines 3, the upper short, very narrowly forked, the others small; dorsals not connected; gill membranes united, free from the isthmus; no slit behind last gill; ventrals I, 3. This genus is closely related to *Artedius, Chitonotus,* and *Astrolytes.* It differs from *Artedius* in the rough head and smaller scales, and from *Astrolytes* and *Chitonotus* in the single fork to the preopercular spine, and in the smaller scales. (*a*–privative, not; *ξυρίας*, a shaveling; *ἀξυρίας*, one unshorn.)

2285. AXYRIAS HARRINGTONI, Starks.

Head 2⅔; depth 4⅕. D. IX–16; A. 12; eye 4 in head; maxillary 2½. Upper profile of head steep from tip of snout to above eyes, thence nearly horizontal; mouth at lower aspect of head, the jaws subequal; maxillary reaching to the vertical from pupil; villiform teeth on jaws, vomer, and palatines; eye set high in head, its diameter a little less than length of snout; interorbital space nearly concave, its width about ½ eye; upper preopercular spine short, its length about ⅓ of eye, very narrowly bifurcate at tip, the forks very small; below it on edge of preopercle a second spine, small and blunt, and a third scarcely developed; nasal spines prominent; top of head and upper part of opercles with patches of ctenoid scales, a patch on posterior part of interorbital space and behind eyes, sending a narrow band backwards along each side of head above opercles, and a few in front of dorsal, leaving a seminaked area in front of occiput, which has a few scales scattered over it; many cirri on top of head scattered among the scales, 1 above posterior edge of each eye, 1 over anterior edge of eye, 2 or 3 around edge of preopercle, 1 on end of maxillary, and 1 at each anterior lateral scale back to about middle of lateral line; a band of rough scales along back, about 7 scales wide anteriorly, and composed of about 47 oblique series; the scales obliquely embedded, the upper posterior edges strongly ctenoid, the lower anterior edges embedded; a naked area of nearly the same width as band between it and spinous dorsal, the band running upwards posteriorly and touching second dorsal at about its middle, running back and joining its fellow of the opposite side behind the second dorsal, and ending midway between base of last ray and base of caudal; a single row of 36 scales similar to the others following lateral line. Dorsal spines subequal from the first to the sixth or seventh, the fin not connected with soft dorsal, which is about the same height as the spinous; pectoral rather large, reaching to the base of fourth or fifth dorsal ray; ventrals scarcely reaching vent; insertion of anal midway between middle of eye and base of caudal, its longest ray about equal to those of dorsal. Ground color olive, with about 5 dark cross bars on back, the first bar under middle of spinous dorsal, the second under front of soft dorsal, the third under its middle, and the fourth under its end, the fifth being represented by a blotch on top of caudal peduncle; a dark streak at base of caudal fin; sides with many clear-cut, round, white spots, growing larger downward; the lower row only half spots where the white of the spot runs into the white on lower part of body; belly white; lips and under parts of head with dark, olive brown, wavy bars of about the same width as the interspaces; fins with wavy dark streaks, except anal and ventrals, which are white. Coloration very similar to *Artedius lateralis*. Length 2½ inches. Puget Sound, in the vicinity of Port Ludlow, Washington. One specimen taken in 1896 by Mr. Starks. ("I take pleasure in naming this species for President Mark Walrod Harrington of the University of Washington." Starks.)

Axyrias harringtoni, STARKS, Proc. Cal. Ac. Sci., series 2, Vol. VI, 1896, 554, pl. 74, Port Ludlow, Washington. (Type, No. 5047, L. S. Jr. Univ. Mus.)

714. ARTEDIELLUS,* Jordan.

Artediellus, JORDAN, Cat. Fish. N. A., 110, 1885 (*uncinatus*).

Head broad; teeth on vomer and palatines; preopercular spines 2, the upper large, strongly hooked upward, with no antler-like processes above; no slit behind last gill; gill membranes free from isthmus; skin naked, smooth; spinous dorsal short, not notched. Northern seas. This genus seems to be nearest to *Artedius*, from which it differs chiefly in the naked skin of head and body. (Name a diminutive of *Artedius*.)

a. Pectoral rays about 30; caudal rays (developed) 11; head with few cirri.
  b. Occiput with a bony protuberance on each side, provided with radiating ridges. UNCINATUS, 2286.
  bb. Occiput without bony protuberance having radiating ridges, its place taken by a blunt occipital ridge or spine. ATLANTICUS, 2287.
aa. Pectoral rays 22 to 24; caudal with 9 developed rays; head with many cirri; occiput with very low round ridges or with none. PACIFICUS, 2288.

2286. ARTEDIELLUS UNCINATUS (Reinhardt).

Head 2½ D. VII or VIII, 12 to 14; A. 11; P. 18; V. 4; eye 2⅘ in head; pores of lateral line 18. Head broad, ovate; eyes set high, the interorbital very narrow, much less than diameter of eye; jaws subequal; teeth rather slender, on jaws, vomer, and palatines. Preopercle armed with 2 spines, the lower short, pointing downward, the upper long, strongly curved and sharp; opercle below with a single spine, terminating above in a soft convex flap, concealing beneath a depressed, but sharp-pointed spine; between the anterior and posterior pairs of nostrils occur 2 short spines and at the occiput 2 others, all of which, in common with the other spines, are directed downward, and project but slightly above the integument; a small, short cirrus on the posterior margin of the upper jaw, immediately in front of angle of mouth; a small, pointed cirrus above eye; origin of first dorsal above base of pectoral, its height ½ head; second dorsal a little higher; anal as high as second dorsal, coterminous with it; pectoral extending slightly beyond front of second dorsal (in adults); ventrals long, reaching nearly to vent. Color whitish with 3 grayish brown bands across body, middle band broadest from base of second dorsal; in adults the bands are broken up and not conspicuous; fins with oblique traverse bands, well defined, except on anal, where they are faint. (Collett.) Arctic Europe; said to cross to Greenland; its range southward uncertain. (Eu.) (*uncinatus*, hooked.)

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*The Japanese genus *Trachidermus*, Heckel (*Centridermichthys*, Richardson), to which this species and many others of our Cottoids have been referred by authors, differs from *Artediellus* in having the slit behind the last gill developed and the gill membranes fully united to the isthmus. It is an ally of *Cottus*, of which genus it may be the ancestor

Cottus uncinatus, REINHARDT, Vid. Selsk. Natur. Math. Afh. 1833, 44, Greenland.
Icelus uncinatus, KRÖYER, Naturh. Tidsskr. 1844, 253.
Centridermichthys uncinatus, GÜNTHER, Cat., II, 172, 1860; COLLETT, Norske Nord-Havs Exped., 29, 1880.

2287. ARTEDIELLUS ATLANTICUS, Jordan & Evermann, new species.

Head $2\frac{5}{6}$; depth 5; D. VII, 13; A. 11; P. 20; eye 3 in head; maxillary $2\frac{1}{8}$; pectoral $1\frac{1}{8}$; pores in lateral line 20. Body rather elongate, robust anteriorly, greatest height at origin of dorsal; body tapering gradually into the long slender caudal peduncle; mouth moderate, the maxillary reaching to below middle of pupil; narrow bands of villiform teeth on jaws, vomer, and palatines; interorbital a narrow ridge; anterior nostril ending in a short tube; a line of pores around orbitals to preopercle; nasal spines present, very short, a pair of blunt protuberances at occiput; a large, sharp, strongly curved spine at preopercle, and a short straight one below it pointing downward and forward; a small fleshy papilla in front of each eye, and a minute thread-like tentacle at end of maxillary; origin of dorsal over base of pectoral; pectoral reaching past notch between dorsals, ventrals inserted behind lower end of pectoral base, in distance equal to length of snout, their tips not quite reaching vent. Color in spirits, creamy, with indications of reddish-brown cross bars, the same color as back; a dark blotch at base of caudal; head somewhat mottled with brown; spinous dorsal blackish with 2 white streaks and a series of spots running transversely across the spines; second dorsal with 6 dark cross-bands, anal with 4 similar bands; pectoral and caudal with 2 or 3 irregular cross bars. This species differs from Collett's figure in the spines on the occiput, being represented in the cut as lower down toward the sides of head, and with radiating striations. Labrador to Cape Cod; in rather deep water. Here described from a specimen $2\frac{1}{2}$ inches long from Massachusetts Bay, taken by the U. S. Fish Commission. Very close to *Artediellus uncinatus* with which it has been hitherto identified, but apparently distinct.

Icelus uncinatus, JORDAN & GILBERT, Synopsis, 693, 1883, specimen from coast of Massachusetts.
Artediellus uncinatus, GOODE & BEAN, Oceanic Ichthyology, 267, fig. 255, 1896.

2288. ARTEDIELLUS PACIFICUS, Gilbert.

D. VII or VIII-12 or 13; A. 11 or 12; P. 23, 2 (22 to 24); V. I, 3; caudal with 9 divided rays (not 11 as in *Artediellus uncinatus*); lateral line 24 (22 to 26); length of head (measured to end of opercular flap) $2\frac{3}{4}$ to $2\frac{9}{10}$; depth $4\frac{1}{6}$; least depth of caudal peduncle $1\frac{3}{4}$ times in orbit; its length, from base of last anal ray, $2\frac{5}{6}$ in head. Very closely related to *Artediellus uncinatus*, differing in the entire obsolescence of the occipital protuberances or ridges, in the increased number of cirri on the head, the more numerous pores of the lateral line, the greater number of rays in the pectoral fins, and the reduction in the rays of the caudal. This diagnosis is the result of a comparison of our types with Collett's description of *Centridermichthys uncinatus* (Norske Nord-Havs Expedition, 1880, 29), no typical specimens being at hand for comparison. Head evenly rounded in all directions, the orbital region not elevated, the snout not angulated; mouth slightly larger in males than in females, reaching vertical from middle or posterior margin of pupil, 2½ to 2⅕ in head; lower jaw shorter than the upper, a portion of the premaxillary band of teeth projecting beyond the mandible in closed mouth; teeth cardiform, in rather broad bands on jaws, and in patches of varying size on vomer and palatines; in some specimens a few teeth occur in a single convex series on front of vomer, and but 3 or 4 form a line on palatines; in others, we find an irregular double series or a narrow band on each of these bones; the teeth are always strong and are probably in adult specimens never entirely wanting on either vomer or palatines; longitudinal diameter of orbit 3½ in head; interorbital space very narrow, shallowly concave, entirely occupied by the supraocular canals, which unite in a single pore opposite posterior margin of orbit; least interocular width ⅔ pupil; premaxillary processes projecting but little beyond the profile; nasal spines very small; both pairs of nostrils in short tubes, the posterior situated on anterior orbital rim; occiput with 2 very inconspicuous low rounded ridges, appreciated with difficulty, and sometimes entirely wanting. No trace of the occipital spine seen in Massachusetts specimens of *Artediellus atlanticus*, nor of the conical protuberances described and figured by Collett. Barbels numerous; maxillary barbel large and conspicuous, sometimes simple, more often compound, furnished with from 1 to 4 short lateral branches; a well-developed supraocular cirrus, and a pair of cirri on posterior margin of occiput, the latter occupying the position of occipital spines; a short cirrus near base of opercular flap, and 2 or 3 on preopercle, 2 of which are usually at base of the preopercular spines; 2 cirri on anterior part of trunk, 1 immediately above base of pectorals, the other halfway between lateral line and front of spinous dorsal; sometimes additional cirri above front of lateral line, and on lower margin of subocular ring; a series of 4 or 5 very short cirri crossing the eye horizontally immediately above the pupil; gill membranes broadly united, joined to the isthmus anteriorly, with a wide free margin; gills 3½, no slit or pore behind last arch; preopercular spines as in *Artediellus uncinatus*, the upper one without smaller basal spine. Dorsal fins well separated, low in females, extraordinarily developed in males, the spinous dorsal in the latter well overlapping front of second dorsal and having all of the spines exserted, the median ones for ½ their length; these exserted spines with their free portions narrowly margined with membrane which widens at their tips to form a cutaneous flap; soft dorsal also somewhat elevated in males; ventral fins reaching halfway to vent in females, about ¾ this distance in males. A series of 5 wide mucous slits running along lower edge of suborbital ring and across cheek; pores of lateral line minute, at the ends of short downwardly directed branches, the main line opening in a large slit-like pore at base of caudal. Color much as in *Artediellus uncinatus*, the lower parts whitish, unmarked, the dorsal region of the trunk crossed by 3 wide dark bars, which often, in adults, break up into spots separated by vermiculations of the lighter ground color, 1 of these bars below the spinous dorsal, running downward and forward to base of pectorals, the second under soft dorsal, the third on caudal peduncle; top and sides of head generally dark, with fine light dots or vermiculations; a light streak sometimes present, extending from preopercular spine forward and inward, meeting its fellow immediately behind eyes; this V-shaped mark usually absent or inconspicuous, but sometimes, in young specimens, formed of bright silvery-white pigment; other silvery spots or blotches may occur on the lighter intervals of the back or sides; pectorals, dorsal, and caudal cross-banded; a black blotch at base of upper and 1 at base of lower pectoral rays; tips of elongate dorsal spines of the male black; ventrals and anal unmarked. Coast of Alaska, in Bristol Bay, south of Sannak Island and north of Unalaska, at depths of from 8 to 61 fathoms.* (Gilbert.)

Artediellus pacificus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 416, south of Sannak Island, at Albatross Station 3216. (Type, in U. S. Nat. Mus. Coll. Gilbert.)

715. RUSCARIUS, Jordan & Starks.

Ruscarius, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 807 (*meanyi*).

This genus is allied to *Icelus*, differing in the stouter, firmer body, and especially in having the back, above lateral line, covered entirely with scattered rough scales, not arranged in a definite band; no naked area below dorsal or in front of dorsal; 3 or 4 preopercular spines, only the upper well developed; no bony plates along base of dorsal; no scales below lateral line; preopercular spine long, bifurcate. Characters otherwise much as in *Artedius* and *Icelus*. (*ruscarium*, from *ruscum*, the butcher's broom, a rough plant, in allusion to the prickly scales.)

2289. **RUSCARIUS MEANYI**, Jordan & Starks.

Head 2½; depth 3½. D. V-14; A. 12; lateral line 6-32; orbit 4 in head; maxillary 2; snout 4; highest dorsal spine 3; highest dorsal ray 3; pectoral 1½; ventrals 2⅔; caudal 2⅓. Body robust, deepest and broadest at shoulders, tapering quickly backward into a slender caudal peduncle; back somewhat elevated; the ventral outline nearly straight from chin to caudal fin; dorsal outline gently and evenly curved from snout to caudal peduncle. Mouth terminal and nearly horizontal, maxillary reaching past pupil nearly to posterior edge of orbit; jaws subequal, teeth in narrow villiform bands on jaws, vomer, and palatines; process of premaxillary prominent, extending between and above nasal spines; preopercular spine well developed, forked at tip, the forks small, the inner one the longer, 3 or 4 short spines below on edge of preopercle; opercle ending in

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*Numerous specimens were taken in 1896 by the *Albatross*, at Stations 3637, 3638, and 3639, off St. Paul Island, in 32, 34, and 27 fathoms; 3643 and 3644, off Provostmaya, Kamchatka, 100 and 96 fathoms; 3647 and 3648, off Robben Island, in 20 fathoms; also taken off Karluk in 1897. Some of these specimens are in better state of preservation and show the head with more pores than could be made out in the types. The top of head is thickly studded with these pores, 3 or 4 of which are in the interorbital space. A series of very wide slits along under surface of mandible, continued to base of preopercular spine. The wide slits along edge of preorbital and on cheek are usually 6 in number.

a flap; top of head with dermal flaps, 1 over anterior margin of eye, and a group of 2 or 3 over posterior margin; a few shorter ones on nape; mucous pores around mandible large; opercle, upper part of preopercle, top of head to eyes, and the orbital ring, covered with sharply ctenoid scales, upper part of iris with small rough scales, balance of head naked. Lateral line with a row of rough plates; upper half of body completely covered with scales, their anterior edge embedded, coarsely ctenoid on their posterior edge; lower half of body naked. Dorsal spines slender, those in the middle highest, the fin without a notch, the longest spines reaching to front of soft dorsal where fin is depressed, well separated from soft dorsal; first dorsal ray inserted over first anal ray, the fin longer and higher than anal; pectorals somewhat pointed posteriorly, reaching just past the space between dorsals; ventrals inserted behind the base of pectorals a distance equal to the length of snout, their tips reaching to the front of the anal; caudal slender, rounded behind. Color olive gray, belly dusky; back with dark cross shades, irregular in number and size, below lateral line light with small wavy bars running across to within a short distance of anal fin, and fading out; head with cross shades above; a dark bar from eye to side of snout, 1 from eye downward past end of maxillary, another behind it across posterior edge of preopercle; some dark markings on maxillary; lower lip dark; pectorals light with dark wavy lines across them; dorsal fins dark and mottled; anal and ventrals varying from white to black; caudal with a dark bar at base, light with irregular dark cross markings. Puget Sound; 2 specimens dredged, about 1½ inches in length, at Point Orchard, near Seattle, Washington. (Named for Edmond Stephen Meany, Professor of American History in the University of Washington, a leading member of the Young Naturalists' Society of Seattle.)

Ruscarius meanyi, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 805, pl. 80, Port Orchard, Elliott Bay, Puget Sound. (Type, No. 3127, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

716. RASTRINUS, Jordan & Evermann.

Rastrinus, JORDAN & EVERMANN, Check-List Fishes, 437, 1896 (*scutiger*).

This genus is near *Icelus*, from which it differs in the absence of the series of dorsal plates, the back being closely scaly as in *Ruscarius*. Four preopercular spines, all simple and weak. Head rough; sides below lateral line scaly; upper preopercular spine simple or bifurcate; body slender; eye very large. Pacific Ocean. (*rastrum*, a scraper, from the rough scales.)

2290. RASTRINUS SCUTIGER (Bean).

Head 3; depth 5. D. IX, 19; A. 18; V. I, 3; lateral line 41; eye twice as long as snout and ⅔ as long as head; maxillary extending to below middle of eye, and broadly expanded behind; interorbital space extremely narrow, less than ¼ length of eye; pectoral extending to above sixth ray of anal; preoperculum having a weak, simple spine hooked upward, and 3 weak ones pointing backward and downward; teeth on vomer and palate;

head with minute spiny scales, most abundant on the upper half; all of the back above lateral line densely covered with small spiny scales; lateral line made up of raised tubes; a few rough scales under lateral line on second half of body; branchiostegal membranes broadly united and well freed from isthmus; slit behind fourth gill obsolete; spinous dorsal very high, its longest spine ⅔ as long as head; about 4 large, dark blotches across back and several smaller ones between them. Length 3⅓ inches. Bering Sea, off Trinity Islands, in deep water. (Bean.)

Concerning this species, Dr. Gilbert observes:

This species is distinguished from all others in the genus *Icelus* by the absence of the series of enlarged spinous plates along the base of the dorsal fin. Our specimens agree with the type in having the sides above lateral line densely covered with scales. These are not uniform in size, and are arranged in rather irregular oblique series. The sides behind pectorals contain large spinous plates, and the tail below lateral line is densely scaled, leaving only a narrow, naked strip along each side of anal base. As stated, the upper half of head is densely covered with small prickles. As in other species of *Icelus,* the upper preopercular spine may be simple or bifurcate. The latter condition obtains in most of our specimens. All of the preopercular spines are weaker than in other species of the genus. Compared with the nearest allies, *Icelus euryops* and *Icelus canaliculatus,* the species is further distinguished by its more robust body (the depth approximately 5 in length, instead of nearly 6), by the smaller eye (in which the snout is contained 1½ times instead of nearly twice), the narrower interorbital space, the very slight development of the occipital crests, the obsolescense of the occipital spines, and the great height of the spinous dorsal fin in the male specimens. It has also a shorter second dorsal fin, the formulæ in 11 specimens being IX, 19; IX, 19; IX, 19; IX, 19; IX, 19; IX, 20; X, 19; X, 19; X, 20; X, 20; X, 20. It has less the appearance of a deep-water species, the mucous canals and pores being less conspicuous and the color lighter, with no brownish-black or blue-black tints. In alcoholic specimens the upper parts are light brown, the lower side of head and belly, including the ventral fins, whitish. A vertical black bar occupies base of upper half of pectorals, a streak extending from its lower end out along middle ray of fin. The black bars characteristic of its congeners are here represented by irregular, rather sharply defined, blotches on back and sides. These extend also onto spinous and soft dorsal fins. A distinct dark streak runs forward from eye, crossing premaxillaries, and leaving tip of snout pale. Mouth and gill cavities white. North Pacific; numerous specimens taken by the *Albatross* south of the Alaskan Peninsula, at a depth of 138 fathoms. (Gilbert.) (*scutum*, shield; *gero*, I bear.)

Icelus scutiger, BEAN, Proc. U. S. Nat. Mus. 1890, 41, Trinity Islands, Alaska, 56° N., 154° 20′ W., at Albatross Station 2853, in 159 fathoms; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 415.

717. ICELUS, Kröyer.

Icelus, Kröyer, Naturalist Tidsskr. I, 253, 1845 (*hamatus*).

Head large. Preopercular spines 4, the upper hooked, simple or bifurcate at tip, without antler-like processes. Occiput with or without spines. Body slender, fusiform, with a dorsal series of bony plates from neck to base of caudal; lateral line with osseus tubercles; scattered scales on sides and belly. Gill membranes broadly united, free from the isthmus, no slit behind fourth gill. Dorsals separate; ventrals I, 3, thoracic; no pectoral filaments. Villiform teeth on jaws, vomer, and palatines. Branchiostegals 6. Arctic regions. (*Ἴκελος*, *Icelus*, son of *Hypnus*, the god of sleep; Kröyer says: "Navnet valgt med Hensyn till ulkearternes Dorskhed, saavelsom til den Nordlige Bopael, nogle af Oldtidens Forfattere anviste Søvnguden.")

- *a.* Anal rays 14 or 15; depth about 5 in length; dorsal IX, 18 to 20; occiput with 2 pairs of spines on each side, a deep median pit between them. BICORNIS, 2291.
- *aa.* Anal rays 17 to 19; dorsal VII to IX, 19 to 24; depth 5 to 6 in length.
  - *b.* Dorsal with 19 or 20 soft rays; depth 5 in length; occiput nearly plain, without pit or prominent ridges. SPINIGER, 2292.
  - *bb.* Dorsal with 23 or 24 soft rays.
    - *c.* Dorsal spines IX; head with the mucous channels not greatly developed; top of head scaly or prickly.
      - *d.* Eye $2\frac{1}{3}$ to $2\frac{1}{2}$ in head, twice length of snout. EURYOPS, 2293.
      - *dd.* Eye $2\frac{5}{6}$ to 3 in head, $1\frac{1}{2}$ times length of snout; top of head with 3 pairs of filaments. VICINALIS, 2294.
    - *cc.* Dorsal spines VII or VIII; top of head mostly smooth; opercles smooth; 1 pair of filaments on top of head; muciferous channels of head highly developed. CANALICULATUS, 2295.
- *aaa.* Anal and dorsal rays unknown; body very slender; depth 7 in length; no occipital spines; eye 3 in head. AUSTRALIS, 2296.

2291. ICELUS BICORNIS (Reinhardt).

Head 3; depth 5. D. IX, 19 or 20; A. 14 or 15; V. I, 3; P. 18 or 19. Head large, naked; upper preopercular spine small, hooked upward, bifurcate, 3 spines below it, 2 of them hooked upward; 2 blunt occipital spines; vertex depressed. Skin of body above with warty scales and small prickles; some rows of bony scales from neck to base of caudal; a series of plates along lateral line; sides of body with scattered scales; scales on sides between the plates variable, as also the scales below pectorals; small scales sometimes along base of anal; interocular space very narrow, its width 4 in eye; dorsals separated; pectorals shorter than head; nuchal spines varying with age; with the young the anterior pair halfway between eye and posterior pair, with adults, the 2 pairs touching, the posterior much longer; preopercular spine simply emarginate in young; adult with the plates more rough; no air bladder; gill membranes broadly joined, free from isthmus; no slit behind last gill. Yellowish, with many brown spots.

Ensign H. G. Dresel thus describes a fine example, 6 inches long, of this species (No. 28630 U. S. Nat. Mus. collection) obtained in Davis Straits by Mr. N. P. Scudder: D. IX, 20; A. 16; P. 18; V. I, 3; lateral line 41.

The body is fusiform, with the abdominal outline nearly straight; the greatest height of the body at the origin of the spinous dorsal fin is $\frac{1}{4}$ of the total length of the caudal base. The caudal peduncle is slender, the least height of the tail being only $\frac{1}{5}$ of the greatest height of the body. The head is large and naked, its length being contained $2\frac{2}{3}$ times in the total length to the caudal base. The nuchal region has a cross ridge in front of which is a quadrate depression. The occiput is armed with a pair of blunt spines, the length of a spine being $\frac{2}{5}$ of the greatest diameter of the eye. At the base of each spine is a blunt protuberance. The preopercle is armed with 4 spines, the upper of which is the longest, bifurcate, and hooked upward, the 1 next below is slightly bent upward, and the remaining 2 are bent downward and forward. The suborbital stay is prominent. The eye is large, placed next to the upper profile of the head, its greatest diameter is equal to the length of the snout, and is $\frac{1}{4}$ of the length of the head. The interorbital area is very narrow and concave, its width being $\frac{1}{4}$ of the greatest diameter of the eye. The maxilla extends slightly beyond the vertical through the posterior margin of the eye, and its length is contained 2 times in the length of the head. The teeth are in villiform bands on the jaws, vomer, and palatines. The body is chiefly naked, with a dorsal series of 23 bony, scale-like plates beginning opposite the sixth dorsal spine and extending upon the upper side of the caudal peduncle; a second series of 41 similar plates along the lateral line. There are 2 or 3 of these plates on either side of the nape, behind the occipital spines, and a patch of 4 or 5 plates below the lateral line in the pectoral region. The spinous dorsal begins over the tip of the opercular flap, and the length of its base is equal to that of the upper jaw; it is composed of 9 slender and flexible spines, the longest spine being as long as the distance from the tip of the snout to the orbit. The soft dorsal, of 20 rays, begins halfway between the tip of the snout and the base of the caudal fin. Its base is nearly as long as the head, and the longest ray is $\frac{1}{3}$ the length of its base. The origin of the anal fin is under the third dorsal ray; the length of its base is equal to the greatest height of the body, and the longest ray is as long as the longest dorsal spine. The caudal fin is rounded, the middle rays being as long as the maxilla. The length of the pectoral base is $\frac{2}{5}$ of that of the head, and the longest pectoral ray is equal in length to the greatest height of the body. The ventral fin is composed of 1 spine and 3 rays, its length being $\frac{2}{5}$ of that of the head. There are no gill rakers, but the anterior arch bears 9 or 10 low tubercles. Color in spirits, a light olive brown above, yellowish below; belly white; a large dark brown blotch, marked with white, extends from the base of the spinous dorsal down upon the side to the base of the pectoral fin, being darkest just behind the opercular flap; a second similar, but narrower, blotch on the back from the seventh to the tenth dorsal rays extends obliquely down and forward to below the lateral line; a third faint blotch on the back, at the end of the soft dorsal; in addition there are numerous smaller spots and blotches along the lateral line, and a triangular spot on the caudal peduncle at the caudal base; cheeks brown, marbled with yellow; dorsal, caudal, and pectoral fins with narrow black transverse bands; a dark spot on the pectoral fin near its base; anal and ventrals colorless.

Concerning its occurence in Alaska, Dr. Gilbert observes:

"Not hitherto recorded from Pacific waters. Our specimens are more constant in their characters than the Atlantic individuals reported on by Collett (Den Norske Nord-Havs Expedition, 1880, 35). A definite narrow band of fine prickles extends along the upper edge of the dorsal series of plates, usually occupying less than ½ the space between plates and base of dorsals, and extending posteriorly to end of soft dorsal. Similar prickles cover top and sides of head. The plates of the lateral line invariably extend to the root of the caudal fin, and the dorsal series to the back of the caudal peduncle. None of the specimens before us has plates along the base of the anal fin. The species differs conspicuously from *Icelus spiniger* and *Icelus canaliculatus* in having a deep pit on occiput, bounded laterally by high occipital ridges, each of which bears 2 rounded prominences or spines. The preopercular spines are longer and sharper, and the bifurcation of the upper spine deeper than in the species mentioned. In 2 individuals the upper spine is trifurcate, the branches very long and curving upward. The fin rays in 6 specimens are as follows: Dorsal VIII, 20; IX, 19; IX, 21; IX, 20; IX, 20; IX, 19. Anal 16, 16, 15, 17, 16, 15. These average slightly higher than counts of Atlantic specimens, none of which is at hand for comparison. The Pacific form may prove specifically separable. The species is not abundantly represented in our collection. It was taken only within a limited area north of Unimak Island, in depths of 17½ to 49 fathoms, at *Albatross* Stations 3250, 3252, 3253, 3254, 3255, and 3256."

Arctic seas; circumpolar, if all specimens named *bicornis* and *hamatus* belong to one species, which is doubtful. Spitzbergen to northern Russia, Finland, Alaska, Labrador, and Cape Cod; abundant about Greenland in 2 to 100 fathoms. Length 6 inches. (Eu.) (*bicornis*, two-horned.)

Cottus bicornis,[*] Reinhardt, Vid. Selsk. Natur. Math. Afh., VIII, 1833, 75, Greenland.

Centridermichthys bicornis, Günther, Cat., II, 172, 1860.

Icelus bicornis, Jordan & Gilbert, Synopsis, 693; Gilbert, Rept. U. S. Fish. Comm. 1893 (1896), 411.

Icelus hamatus, Kröyer, Nat. Hist. Tidsskr., I, 253, 1844, Belsund in Spitzbergen; Günther, Cat., II, 172; Günther, Challenger Report, XXII, 63; Collett, Norges Fiske, 35; Collett, Forh. Vid. Selsk. Christ., 14, 1880; Collett, Norsk Nordh. Exped., Fiske, 34, tab. 1, fig. 8; Nyt Mag. f. Naturvid., XVIII, 56, 1884; Lütken, Kara-Havets Fiske in Dijmphna-Togtet, 123; Lütken, Vid. Met. Nat. For., 92, 1876; Ström, Norsk. Vid. Selsk. Skrift., 18, 1884; Lilljeborg, Sverig. och Norg. Fiske, 164; Dresel, Proc. U. S. Nat. Mus. 1884, 252.

Icelus furciger, Malm, Forhandl. Skand. Naturf., 9 Mote, 410, 1865, Bohuslän, Sweden.

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[*] According to Dr. Lütken, *Cottus bicornis* is identical with *Icelus hamatus*, this opinion being based on a drawing of *bicornis* left by Reinhardt. Lütken also thinks that *Cottus polaris* may be the same fish. *Cottus polaris* is said to have D. VI to VIII, 13; A. 14; *Cottus bicornis* was said to have D. VIII, 15; A. 14; while in *Icelus hamatus*, Collett counts D. VIII, 19; A. 15; Lütken, D. IX, 19 or 20; A. 14 or 15.

2292. ICELUS SPINIGER, Gilbert.

Head 2⅘ to 3; depth 5; eye 3 to 3½ in head. D. IX, 20; A. 17; P. 18; V. I, 3. Closely resembling *Icelus bicornis*, but differing conspicuously in the armature of the dorsal series of plates in the comparatively plane occiput, and in other characters. Caudal peduncle very slender, its depth 2½ in orbit; mouth large, the maxillary reaching slightly beyond middle of orbit, its length ½ head; teeth very finely villiform, present in rather wide bands in jaws and on vomer and palatine bones; nasal spines strong, separated by the high ascending processes of the premaxillaries; interorbital space very narrow, grooved, its width less than ½ diameter of pupil; orbital rim becoming elevated anteriorly and posteriorly, and, at the latter point, strongly denticulated; behind the orbital region, the occiput is shallowly concave, being bounded laterally by 2 low, evenly rounded ridges, which become narrower posteriorly, and end each in a strong spine projecting backward in line with the series of dorsal prickles; preopercular spines similar to those of *Icelus bicornis*, the uppermost, as in the latter, occasionally simple instead of bifurcate; the second spine usually directed straight backward, and the 2 following downward and forward; gill membranes broadly united, free from the isthmus, and neither pore nor slit behind the innermost gill; branchiostegals 6; eye large, longer than snout; a slender tentacle present over the posterior part of each orbit; a series of plates from nape along each side of dorsals to back of caudal peduncle, and a second series along lateral line, as in *Icelus bicornis;* the dorsal series with 28 to 35 plates, each of which bears at its center a single strong spine directed outward and backward. In *Icelus bicornis*, each plate is traversed by an oblique ridge, the margin of which is denticulated, the central tooth being the strongest and corresponding to the single spine present in *Icelus spiniger*. The latter agrees with *Icelus canaliculatus* in having an inner series of dorsal plates alternating with the principal series, each of the smaller plates bearing a minute prickle, discernible with difficulty. The plates along the lateral line, 41 to 44 in number, are similar to those in *Icelus bicornis*, having their upper and posterior free margins serrulate. A few scattered spinous plates present in axillary region. Dorsal fins not connected, the spines very slender and rather high; pectorals long, reaching front of anal; ventrals not reaching vent. Color light olivaceous above, white below; upper parts mottled with dark brown; back with 4 faint black cross bars, the first under spinous dorsal, the second and third under soft dorsal, the fourth at base of caudal; a brown blotch on cheek, 1 on base of pectoral, and an irregular series along full length of body just under the lateral line; 2 prominent black blotches on first dorsal; the second dorsal, caudal, and pectoral barred; other fins unmarked; mouth and gill cavity white. Coast of Alaska; numerous specimens from Albatross Stations 3216, 3224, 3225, 3226, 3257, 3258, 3263, 3267, 3278, 3279, 3280, 3292, 3302, 3311, 3334, in 17 to 121 fathoms. These stations are located in the vicinity of

Unalaska Island and in Bristol Bay, Alaska.* (Gilbert.) (*spiniger*, bearing spines.)

Icelus spiniger, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 412, pl. 24, Bristol Bay and Unalaska, at Albatross Stations 3216, 3223, and elsewhere, in 17 to 121 fathoms.

2293. ICELUS EURYOPS, Bean.

Head 3; depth 5⅔. D. IX, 23; A. 18; V. I, 3; lateral line 43. Eye about twice as long as snout and ⅖ as long as head. Maxilla scarcely extending to below middle of eye; interorbital space about ¼ length of eye; occiput with 2 spines; pectoral extending to above second ray of anal; preopercle armed as in *Icelus scutiger*; vomer and palate well toothed; head scaled as in *Icelus scutiger;* lateral line composed of raised tubes; a single series of spiny scales on back along base of dorsals; branchiostegal membranes broadly united, free from isthmus; slit behind last gill obsolete. Spinous dorsal low, its longest spine less than ⅓ length of head. Four dark bands across back, the first over the end of the spinous dorsal, 2 on the soft dorsal, and 1 at base of caudal. General color light brown. Bering Sea, off Trinity Islands. (Bean.)

Dr. Gilbert has the following notes on 1 of the cotypes (No. 45367, U. S. Nat. Mus.) of *Icelus euryops*, kindly loaned by Dr. Bean: Specimen 77 mm. long, 65 mm. to base of caudal fin. Head 22 mm. to end of opercular spine; depth 11; orbit 10½; snout 5½; maxillary 11; interorbital width 1⅙. Dorsal IX, 23; anal 19; pectoral 18; caudal 9 (divided rays). Preopercular spines as in *Icelus vicinalis*, the upper spine abnormal on 1 side, showing 3 points instead of 2; below the forked spine are 3 others, 1 directed backward and a little downward, 1 nearly vertically downward, and 1 downward and forward; nasal spines strong; occipital ridges obvious with easily perceptible slender spines, about as in *Icelus vicinalis*, broadly rounded anteriorly, scarcely ridge-like until immediately in front of spines. Head rather closely invested with scales, scarcely so rough or so numerous as in *Icelus vicinalis*, but more so than in *Icelus canaliculatus*; opercle covered with scales. Filaments as in *Icelus vicinalis;* 1 pair above eyes, 1 anteriorly on occiput, and 1 occupying tips of occipital spines; the pair on opercle cannot be made out. Armature of body as in less strongly scaled specimens of *Icelus vicinalis*; lateral line provided with the usual spinous scales, 43 or 44 in number; 40 scales in the dorsal series, which extends to base of caudal; above it a rather crowded irregular series of smaller scale-like prickles, some of which are larger than the others and alternate rather regularly with the plates on the principal series; posteriorly the smaller of the upper series are absent, the alternating larger ones alone present; 10 or 12 small spinous plates are irregularly disposed between lateral line and dorsal series; a patch of spinous plates behind pectorals. Color evidently as in *Icelus vicinalis,* though very greatly faded from exposure to light; the back shows traces of 2 dark cross bars under soft dorsal; 1 occupies end of caudal peduncle, and a very indistinct one extends downward from spinous dorsal which is black posteriorly; belly and under parts generally dusted with fine black specks, the isthmus becoming abruptly white; nostril tube white; subocular region blackish, the color continued forward into the preorbital, opposite the front end of which it crosses upper and lower lips; a dark blotch on maxillary in advance of tip; pectorals dusky. (εὐρύς, wide; ὤψ, eye.)

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* Specimens were obtained in 1896 by the *Albatross* at Stations 3643 and 3644, off Provostmaya, Kamchatka, in 100 and 96 fathoms. Females of this species seem more spinous than males. The spines on supraorbital ridge are higher, the suborbital stay is frequently provided with 2 low spinous points, and the top and sides of head, as well as the bases of the dorsal series of spinous plates, may be thickly beset with small prickles.

Icelus euryops, BEAN, Proc. U. S. Nat. Mus. 1890, 41, off Trinity Islands, at Albatross Station 2853. (Type, No. 45367, U. S. N. M.)

2294. ICELUS VICINALIS, Gilbert.

Head $3\frac{1}{7}$ to $3\frac{1}{4}$; depth $5\frac{3}{4}$. D. IX, 21 to 23; A. 18; P. 16; C. 9. This species is extremely close both to *Icelus canaliculatus,* with which it was found associated, and to *Icelus euryops,* Bean. From *Icelus canaliculatus* it differs in the following respects: The coloration, though similar in pattern is much lighter. The belly is dusky, but not deep brown; the isthmus usually becomes abruptly white under the branchiostegal membranes, and the latter are white or dusky, not blue black as in *Icelus canaliculatus.* The floor and anterior part of the roof of the mouth and the gill cavities are white, not blackish. The nostril tube is white, not black. The occipital ridge is lower and less conspicuous, and the spines shorter, but both are obvious. The small spinous point on suborbital stay is less developed. The dorsal spines are 9 in number in all our specimens. A closely crowded series or narrow band of prickles accompanies the dorsal series as in *Icelus canaliculatus.* It is noticeable, however, that those of the series which occupy a position corresponding to the interspace between the dorsal plates are somewhat enlarged, and recall the alternating plates of *Icelinus.* The region between the lateral line and the dorsal series is almost completely invested with spinous scales in most specimens, while in *Icelus canaliculatus* few or none are present. The head is densely covered with small spinous scales or prickles especially numerous on top of head, and on opercle. In *Icelus canaliculatus* the head is either naked or sparsely covered and the opercles almost or quite naked. Three pairs of slender filaments on top of head, the anterior pair the largest, placed above back of orbit; the second pair in front of and slightly within the occipital ridges, the third pair on occipital spines. An additional pair on opercles seems to be less constant. The supraocular pair alone is present in *Icelus canaliculatus.* The mucous canals and pores, though large, are less developed than in *Icelus canaliculatus,* the fish having, in general, the bathybial characteristics less pronounced. The agreement with *Icelus euryops* is closer than with *Icelus canaliculatus.* In fact, it seems to differ from *Icelus euryops* only in the much smaller eye and the somewhat wider interorbital space, agreeing with *Icelus euryops* in all those respects in which it differs from *Icelus canaliculatus.* In *Icelus vicinalis* the eye is $2\frac{5}{6}$ to 3 in head, and but 1½ times length of snout, and the least interorbital width is 11 or 12 times in head. In *Icelus euryops* (cotype, No. 45367, U. S. Nat. Mus.), the eye is 2⅓ times in head and twice the length of the snout, and the least interorbital width 16 times in head. It does not seem probable that the species will vary to that extent. Maxillary reaching middle of pupil, 2¼ in head. Upper preopercular spine slender, forked at tip, directed upward and backward, the second and third spines simple, slender, the second directed downward and backward, the third downward and forward. Interorbital space shallowly grooved, the groove widening backward into an occipital depression bounded in front by the somewhat elevated interocular space, laterally by the occipital ridges; supraorbital rim elevated in front and behind; occipital ridges low, broad and rounded anteriorly, becoming narrower and more crest-like posteriorly. In addition to the prickles and plates already mentioned, there is a band of spinous scales behind axil of pectorals. Spinous dorsal low, the longest spine 2½ in head, the longest ray of soft dorsal 2 in head; pectorals reaching beginning of horizontal portion of lateral line, the lower rays thickened, their membranes incised; ventrals short, scarcely reaching vent. Anal papilla large. Color in spirits; light brown above, with 4 blackish cross bars, 1 under spinous dorsal joining the dark axillary patch, 2 under soft dorsal and 1 at base of tail merging into the uniform deep brown of the under parts; head light brown above and below; subocular ring dark brown, this streak widening forward and crossing upper and lower lips; a small patch at base of exposed portion of maxillary; opercle blackish; upper half of pectorals light, with or without a brown basal bar, the distal portion indistinctly barred with light brown; lower half of pectorals, and all of ventrals dark brown, or black; dorsals blackish, darkest above the cross bars on back; anal black; caudal whitish, dusky above toward tip. Bristol Bay, Alaska, where numerous specimens, 50 to 110 mm. long, were obtained by the *Albatross* at depths of 109, 351, 350, and 406 fathoms, respectively. (Gilbert.) (*vicinalis*, near, to *Icelus euryops*.)

Icelus vicinalis, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 413, Bristol Bay, Alaska, at Albatross Stations 3324, 3330, 3331, and 3332, in 109 to 406 fathoms. (Type, No. 48737.)

2295. ICELUS CANALICULATUS, Gilbert.

Head 3 to 3½; depth 6. D. VII or VIII, 23 or 24; A. 19; P. 16; V. 13; lateral line 43 to 46. A deep-water species, with conspicuous mucous canals and pores, thin cranial bones, and rather plain blackish coloration. In other characters it stands somewhat intermediate between *Icelus bicornis* and *Icelus spiniger*. The dorsal plates have the serrulated cross ridge of *Icelus bicornis*, the occiput is shallowly concave, with low bounding ridges ending behind in strong spines, and the posterior rim of the orbit is elevated and denticulated, as in *Icelus spiniger*. In its anterior portions, at least, the series of dorsal plates is accompanied above by a more or less irregular row of smaller plates, which alternate with the larger plates, and bear each a small spine. Caudal peduncle long and very slender, its depth less than ⅓ its length. Maxillary reaching to or nearly to vertical from middle of orbit, 2⅖ to 2⅗ in length of head; jaws weak; teeth villiform, with widened base, in moderate bands on jaws, vomer, and palatines; nasal spines strong, projecting above a transverse depression which crosses snout immediately on front of orbits; interorbital space narrow, its least width 3⅔ times in orbit, its width wholly occupied by the 2 conspicuous supraorbital mucous canals; occiput a shallowly depressed pit, bounded anteriorly by the raised orbital region, laterally by low rounded ridges each of which terminates behind in a very strong spine; preopercular spines slender and sharp, the uppermost directed very obliquely upward, sharply notched at tip; the second and third are directed downward and backward, the lowermost downward and forward; bony stay across cheek conspicuously developed, and bearing a distinct spine just behind eye; a series of mucous slits along under side of suborbital stay; a sharp spine on subopercle; gill membranes broadly united, free from isthmus; branchiostegals 6; a distinct slit-like pore behind fourth gill; eye large, 3 in head, longer than snout; top and sides of head with many minute scattered whitish pores; a minute filament near tips of maxillary; plates of lateral line 43 to 46 in number, their upper and posterior edges free, denticulated; dorsal series with 45 plates, each of which is crossed obliquely by a raised spiny ridge, the central portion of which is highest; between the upper angles of these plates a second series of small plates alternating with the first, each bearing a spine or prickle, these spines occasionally doubled or trebled, especially in the anterior part of the series, and recall strikingly the arrangement in *Icelinus;* axil of pectorals with 20 to 26 plates similar to those of lateral line, and showing a tendency to a regular arrangement; 2 or 3 similar plates along anterior part of base of anal, and a few scattered plates on each side between lateral and dorsal series. Color light olivaceous above, blackish below, except lower jaw; back with 4 black cross bars, evident, but not conspicuous; opercles black; fins all dark; pectorals mottled with slate color; base of caudal fin light; mouth and gill cavity dark. Length 5 inches. Bering Sea, north of Unalaska, in deep water. (Gilbert.) (*canaliculatus*, with small canals.)

Icelus canaliculatus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 412, pl. 24, off Unalaska, at Albatross Station 3329, in 399 fathoms.

2296. ICELUS AUSTRALIS, Eigenmann & Eigenmann.

Head 3; depth 7; eye 3 in head; maxillary 2. Body rounded in transverse section, scarcely compressed in the abdominal region, tapering from the shoulders to the slender tail. Mouth large, the maxillaries reaching beyond pupil. Occiput without ridges or spines; interocular space slightly grooved, very narrow, its width about ¼ the diameter of the pupil; profile straight; upper preopercular spine rather short, simply dilated at the extremity or with a single upward-directed spine near its tip; 3 simple spines below it. Belly and an interrupted band along the sides white; a series of blackish spots or interrupted band along the sides. Cortez

Banks, off San Diego. Types, 2 specimens, 0.04 and 0.05 m. to base of caudal, in 45 fathoms. These specimens were taken from the stomach of *Sebastodes miniatus* and are partly digested. The anal and dorsal fins have all disappeared. The dentition and armature of the head indicate that this species is closely related to *Icelinus quadriseriatus*, of which it is possibly the young. (Eigenmann.) A very imperfectly known species, not seen by us, perhaps not belonging to *Icelus*, but apparently nearest that genus. (*australis*, southern.)

Icelus australis, Eigenmann & Eigenmann, West Amer. Sci. 1889, 131, Cortez Banks, California. (Coll. C. H. Eigenmann.)

718. RADULINUS, Gilbert.

Radulinus, Gilbert, Proc. U. S. Nat. Mus. 1890, 88 (*asprellus*).

Body very slender. Opercular spines 2. Spinous dorsal short, the soft dorsal and anal very long. Gill membranes broadly united, posteriorly free from isthmus. No slit behind last gill. Broad bands of cardiform teeth on jaws, a single series on vomer; no teeth on palatines. Preopercle with 2 short, simple spines. Ventrals I, 3. Sides armed with a series of large, keeled, spinous plates along lateral line; similar plates on head; no smaller scales. Pacific coast. (*radula*, a scraper.)

a. Eye small, 3⅔ in head; interorbital space naked. BOLEOIDES, 2297.
aa. Eye larger, about 2⅔ in head; interorbital space armed with spinous plates. ASPRELLUS, 2298.

2297. RADULINUS BOLEOIDES, Gilbert, new species.

Head 4 in length; depth 9; eye 3⅔ in head (2⅔ in *R. asprellus* of the same size); snout 3⅓; maxillary 2⅗. D. XI, 22; A. 23; pectoral 18; ventrals I, 3; 42 plates in the dorsal series. Head and body very elongate, depressed anteriorly, the occiput wider and flatter than in *R. asprellus;* snout long, depressed and tapering, much as in the Darters; interorbital space very narrow, about ½ diameter of pupil; mouth horizontal, at lower side of snout, the maxillary reaching a vertical which traverses eye midway between its front and front of pupil. Fine teeth in bands in jaws and on vomer, none on palatines. In *R. asprellus*, also, the vomerine teeth are in a band, not in a single series as stated in the original description. Branchiostegal membranes broadly united, wholly free from the isthmus in the type. In *R. asprellus* the gill membranes vary in this respect, being sometimes wholly free from the isthmus, sometimes attached for ½ or more than ½ their width. Preopercle with 2 short simple spines, the upper slender and sharp, directed backward and slightly upward, the lower broader and shorter, directed backward and downward; below and in front of these are 2 rounded prominences which bear no spines; opercle ending in a triangular process which is scarcely spine-like; nasal spines rather small, a depression between and behind them; no spines on orbital rim, which is not at all raised; the narrow interorbital space not grooved; occiput broad and flat without ridges or spines; a slender filament on upper posterior border or orbit and a similar filament on each side of occiput on its posterior line. Body with a dorsal series of imbricated spinous plates similar to those in *R. asprellus;* but the plates are smaller, with less evident keels and shorter spines; along its anterior third the series is accompanied above by a narrow band of smaller plates, which are continued anteriorly on sides of occiput, and merge anteriorly into the patch behind the eyes; posterior portion of snout, the opercles, and the posterior line of occiput with spinous scales; head otherwise naked. Vertical fins with long slender rays as in *R. asprellus;* dorsal fins separate, but the interspace less than diameter of pupil; distance from front of anal to vent equaling ⅔ diameter of orbit; ventrals short, reaching halfway to front of anal; pectorals reaching slightly beyond front of anal, ⅞ length of head. Color light olive or grayish, the lower parts unmarked, the breast and belly silvery; back crossed by 4 wide brownish-olive cross bars, the anterior of which under spinous dorsal becomes merged into the general brownish-olive coloration of upper portion of head and nape; edges of bands sharply defined and marked with concave indentations where encroached upon by roundish light-colored areas; spaces between bands slightly dusky and marked with some irregular, small, dark blotches along middle of sides; anteriorly on the back are pairs of round, light-colored spots with darker edges, some of them showing silvery pigments; a small silvery spot above base of each pectoral fin; a narrow dark line across occiput behind eyes; dusky blotches on cheeks; a dark bar across maxillary and lip; a pair on maxillaries; 2 faint dark bars on the caudal fin, the fins otherwise translucent or whitish, unmarked, differing from *Radulinus asprellus* in the much smaller eye, the scaled interorbital space, the presence of supraocular and occipital filaments, the smaller size and weaker spines of plates of the dorsal series, and the different coloration. Only the type known, a young female 72 mm. long (No. 48795, U. S. Nat. Mus.) from *Albatross* Station 3664, off Santa Catalina Island, California, in 59 fathoms. (*βολίς*, dart; *εἶδος*, resemblance from its marked likeness to the Darter, *Boleosoma.*)

2298. RADULINUS ASPRELLUS, Gilbert.

Head 4⅕ to 4¼; depth 8½ to 9½. D. VIII to X, 21 or 22; A. 23 or 24; lateral line 38 to 40. Body very elongate, the greatest depth at occiput, 1⅓ in width of head. Body subquadrate in cross section, the upper angles being formed by the keel of lateral plates, tapering gently to the very slender, flat caudal peduncle, everywhere as wide as or wider than deep. Eyes large, closely approximated, the interorbital space very narrow, not grooved, less than ¼ pupil; orbit 2⅔ to 2¾ in head. Mouth small, reaching front of pupil, 2¾ in head. Preopercular spines 2 only, short, simple, the lower directed backward, the upper backward and upward; nasal spines long and strong, a depression behind them; head otherwise smooth; occiput not ridged; a series of large, keeled, spinous plates along lateral line, running high on sides, their free edge turned obliquely upward, and armed with from 1 to several long spines mesially, and shorter ones above and below; a row of minute spinous plates along upper edge of series anteriorly, the series along lateral line continued forward on top of head, meeting its fellow in a V-shaped patch filling posterior portion of interorbital space; similar plates on snout and opercle, the head and body otherwise naked. In cross section the plates mark an abrupt angle, the back being flat, the sides vertical. Dorsal spines slender, the 2 fins well separated; rays of soft dorsal and anal very slender, rather long; caudal truncate or rounded, ⅔ head; pectorals with 18 or 19 rays, reaching to or nearly to vent; anal papilla very long in males, more than ⅓ head. Color light olivaceous, with a series of elongate, narrow, brown streaks along middle of sides, the latter also finely punctate with black; a dark streak in front of eye; fins translucent, the dorsals, pectorals, and caudal with some black spotting, which shows a tendency to form bars; anal and ventrals white. Length 5 to 6 inches. Coasts of Oregon and Washington, the types from depths of from 43 to 77 fathoms. Also found in Puget Sound by Mr. Starks. (Gilbert.) (*asper*, rough; *asprellus*, a diminutive from *Aspro*, a genus of *Percidæ*.)

Radulinus asprellus, GILBERT, Proc. U. S. Nat. Mus. 1890, 88, off Oregon and Washington, at Albatross Stations 3046, 3057, 3058, 3059 (Type, No. 43096); JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 805, pl. 81.

719. STELGISTRUM, Jordan & Gilbert, new genus.

Stelgistrum, JORDAN & GILBERT, Fishes of Bering Sea, in Fur Seal Invest. for 1896, 1897 MS. (*stejnegeri*).

Shaped as in *Hemilepidotus*, which it resembles in appearance but with which it is not closely related. Gill membranes widely joined across the throat, wholly free from the isthmus. Teeth on jaws and vomer, none on palatines. No slit or pore behind last gill. Upper preopercular spine simple, gently upcurved, 3 short spines below it. No opercular rib or spine. Nasal spines short and strong. Vertex without spines or ridges and without long tentacles. Spinous dorsal without anterior notch, the vertical fins all few-rayed. A series of plates along lateral line and a band along the back which merges anteriorly into the mass of minute plates covering top and sides of head. Ventrals I, 3, without setæ. Vent immediately before origin of anal. (*στέλγιστρον*, scraper.)

2299. STELGISTRUM STEJNEGERI, Jordan & Gilbert.

Head 2⅗ in length; depth 3⅘. D. IX, 17; A. 13; P. 16; caudal with 9 divided rays; lateral line with 40 plates; lower series of dorsal band containing 35 to 38 plates. Head narrowly wedge-shaped, tapering upward; width below eyes equaling length of snout and ½ eye; width at preopercles equaling depth at occiput. Mouth large, slightly oblique, the wide maxillary reaching vertical behind pupil, equaling length of snout and eye, ½ length of head. Teeth small, uniform, in narrow bands on jaws and vomer; palatines toothless. A deep naked transverse groove between nasal spines and front of orbits; orbital rims moderately elevated, the interorbital space very narrow, channeled; occiput flat or slightly concave, angulated along lines running backward from orbits, but without spines or ridges; a slender filament above each eye, 2 minute pairs along sides of occiput, 1 on suborbital stay, 1 on maxillary, and a few on plates of lateral line; no nasal cirri, none along edge of preopercle; upper preopercular spine gently curved upward, without cusps or processes; below it 3 short spines, the first directed backward, the second vertically downward, the third, somewhat longer, directed downward and forward. Eyes small, the diameter equaling length of snout, ¼ length of head measured to end of opercular flap; interorbital width equaling diameter of pupil. Straight portion of lateral line longer than the obliquely placed anterior portion, which is not strongly curved; plates of lateral line strongly spinous on their upper free edges, and of similar and nearly equal size throughout; dorsal band continued on to back of caudal peduncle, where it is continuous with the band of the opposite side, the lower plates of the band in a definite lengthwise series and as large as those of lateral line or slightly larger, the other plates of the band decreasing rapidly in size toward base of fin, where they are minute. They are partially arranged in series running obliquely upward and backward from the lower larger plates to the bases of the dorsal rays, on which they extend for at least ½ the height of ray. Dorsal spines with minute spinous plates extending almost or quite to their tips. The snout, top of head, nape, suborbital ring, opercles, and cheek above the suborbital stay covered with minute plates similar to the upper part of dorsal band, with which the invested area on top of head is continuous; sides below lateral line naked except for a few plates behind axil. Dorsals divided to the base, the last spine extremely short, its membrane joining extreme base of the first soft ray; spinous dorsal low, of slender weak spines, the longest ray ⅓ length of head; longest soft ray 2¼ in head; anal beginning under third ray of soft dorsal, ending under its fourteenth ray; caudal peduncle slender, its least width ⅓ its length; pectorals broad and short, all simple, the lower thickened with moderately incised membranes, the eighth to the tenth rays the longest, extending beyond vertical from origin of anal; ventrals not reaching vent, 2⅙ in head. Ground color light grayish olive; lower part of sides regularly reticulated with narrow dusky lines; a dusky cross bar from base of posterior dorsal spines and forward to axil; a second much broader bar from front of soft dorsal, ending irregularly below where it merges into the reticulating lines; a third broad bar, less clearly defined, under posterior portion of soft dorsal; a conspicuous broad V-shaped blotch at base of caudal, the apex directed forward; a faint dark streak from eye forward to tip of mandible, and a cross bar behind eyes, continued faintly on to cheek; spinous dorsal with a small dark spot on anterior and 1 on posterior spines; rays of soft dorsal and caudal with dusky markings so arranged as to form fine cross bars; terminal half of pectorals finely cross-barred, the proximal half plain, with a large dusky blotch on extreme base; anal very faintly barred; ventrals unmarked. Bering Sea, off Robben Island; one specimen 52 mm. long, dredged in 10 fathoms. (Named for Dr. Leonhard Stejneger, Curator of Reptiles in the U. S. National Museum.)

Stelgistrum stejnegeri, Jordan & Gilbert, Fishes Bering Sea, in Rept. Fur Seal Invest. for 1896, 1897 MS., Robben Island (Coll. *Albatross.*)

720. TRIGLOPS, Reinhardt.

Triglops, REINHARDT, Vid. Selsk. Natur. Math. Afh., V, 1832, 52 (*pingeli*).

Body rather elongate, the tail very slender. Head small and compressed. Mouth moderate; villiform teeth on jaws and vomer, none on the palatines; preopercular spines 4, small, simple; head prickly, but without scales; a row of enlarged plate-like scales along the lateral line; a similar row above it at the base of the dorsal fin; the space between these densely prickly; lower half of body crossed at short intervals by transverse undulating folds of skin, the edge of the fold with minute rough scales, causing it to appear sharply and finely serrate, these cross folds being really formed by branches of the lateral line. Gill membranes united, free from the isthmus; a distinct slit behind last gill. Dorsal spines rather high and slender; ventrals I, 3. Arctic seas. (*Trigla; ὤψ*, appearance; the transverse folds resembling the lateral plates of *Trigla.*)

a. Breast crossed by folds of skin similar to those on body.
  b. Eye moderate, 3 to 3½ in head; maxillary and lower part of cheek without prickles; maxillary 2 to 2¼ in head; soft dorsal of 23 to 26 rays.
    c. Back olivaceous, varied with darker; fins largely prickly; eye about 3 in head. Atlantic. PINGELI, 2300.
    cc. Back olivaceous, with 4 black, saddle-like blotches; eye 3¼ to 3⅗ in head; fins less prickly. Pacific. BEANI, 2301.
  bb. Eye very large, 2½ in head; maxillary and lower part of cheek prickly; maxillary 2¼ to 2½ in head; soft dorsal of 21 to 23 rays. SCEPTICUS, 2302.

2300. TRIGLOPS PINGELI, Reinhardt.

Head 3¾. D. XII–25; A. 25; P. 19; V. 4; scales 48; eye 3 in head. Snout short and sharp; eyes large, larger than length of snout; interorbital space equal to diameter of pupil; jaws subequal; teeth minute, on jaws and vomer. Body above and head closely covered with minute granulations; encircling the orbit is a series of small warty protuberances; preopercle with 4 small spines but slightly projecting beyond the skin, the uppermost pointing upward and backward, the others downward; no spines on opercle; nasal spines present; above the lateral line the whole of the body is rough with granulations, below with oblique and dentate membranaceous folds; 47 to 49 dentate osseous plates along lateral line; a series of spines along the base of dorsals, ceasing under the middle of second dorsal. Space between dorsals about equal to the diameter of pupil, all the rays slender and very brittle; first dorsal a little higher than second. Olivaceous, somewhat variegated with darker; fins barred; a series of dusky spots along sides; an ocellated black spot on posterior part of spinous dorsal. (Collett.) Males larger than females and much more common. North Atlantic, from Spitzbergen and western Norway to Greenland and south to Cape Cod and Christiansund, in rather deep water; not rare in 16 to 150 fathoms. Length 5½ inches. (Eu.) (A personal name.)

Triglops pingeli, REINHARDT, Vid. Selsk. Natur., V, 1832, 52, Greenland.
Triglops pleurostictus, COPE, Proc. Ac. Nat. Sci. Phila. 1865, 81, Godhavn, Greenland (anal rays 27); GÜNTHER, Cat., II, 173; LÜTKEN, Vid. Medd. Naturh. Foren. Kjöbenh. 1876, 90; JORDAN & GILBERT, Synopsis, 713.

2301. TRIGLOPS BEANI, Gilbert.

Head $3\frac{2}{7}$ to $3\frac{2}{5}$; depth 6; snout longer than eye, $3\frac{1}{5}$ to $3\frac{1}{3}$ in head; eye $3\frac{1}{4}$ to $3\frac{2}{5}$; D. X or XI, 23 to 26; A. 24 to 26; C. 12; P. 18; V. I, 3; lateral line 48 to 50; branchiostegals 6. Body heavy at shoulders, tapering rapidly to slender caudal peduncle; depth of caudal peduncle $\frac{1}{4}$ its length from base of last dorsal ray; greatest width of head slightly less than its depth, its lower profile straight, the upper descending in a gentle, even curve; mouth nearly horizontal, the maxillary almost reaching vertical from middle of eye, $2\frac{1}{6}$ to $2\frac{1}{4}$ in head; villiform teeth on jaws and vomer, none on palatines; supraorbital rim slightly elevated, a groove-like depression behind it; interorbital space rather wide, forming a shallow groove, its width $3\frac{1}{3}$ to 5 in diameter of orbit; occipital ridges obsolete, a faint trace of them sometimes present, never ending in a spine; opercle with 4 spinous points, the lowermost directed downward and forward, the others radiating downward and backward. Branchiostegal membranes broadly united, free from the isthmus. Longest dorsal spine $3\frac{1}{3}$ to 4 in head; base of spinous dorsal $1\frac{9}{10}$ to $1\frac{1}{2}$ in head; of soft dorsal $2\frac{2}{3}$ to 3 in length of head and body; length of base of anal $2\frac{9}{10}$ in head and body; caudal slightly emarginate, $2\frac{1}{10}$ in head. Head and upper part of body densely covered with very fine prickles, much finer than in *Triglops scepticus;* lower side of head, the maxillaries, and a narrow strip along the lower side of cheek naked; the usual series of enlarged prickles along the base of dorsals; lateral folds few in number, scarcely exceeding the scutes of the lateral line; they leave a wide, naked strip along the base of anal and do not encircle the caudal peduncle below; breast with 5 or 6 cross folds similar to those on the sides, the scales along margins of folds very small, those of successive folds widely separated, not overlapping as in *Triglops scepticus.* Color light olive brown above, whitish on lower parts of sides and below; the breast and belly, including area in front of pectorals, silvery; back crossed with 4 saddle-shaped black blotches, most distinct in the males; the first of these under the middle of the spinous dorsal and extending obliquely forward to the upper axil of pectorals, the second and third under the soft dorsal, narrowing rapidly downward to lateral line, the fourth on the back of caudal peduncle. In males, the lower ends of these cross bars are connected by a narrow lengthwise jet-black streak, extending from shoulder below lateral line nearly to base of caudal, the narrow interval between this streak and lateral line occupied by a bright silvery streak, interrupted by the cross bars; a black blotch at base of upper and 1 at base of lower caudal rays; a small black spot near tips of the outer caudal rays, the fin otherwise unmarked; an indistinct, dusky blotch below the eye, and a dusky streak along under side of suborbital stay, extending forward along the margin of the preorbital to tip of snout; a blotch on middle of maxillary and upper lip; front of lower lip dusky; a dark blotch on opercle, and a dusky bar on branchiostegal membranes. In the females the general pattern of coloration is the same, but the darker markings are less distinct, and the black lateral streak of the males is represented by a disconnected series of irregular, dark blotches and vermiculations. In both sexes the dorsals and pectorals are crossed by narrow, dusky bars, formed by series of dark streaks on the rays; mouth whitish; gill cavity silvery white, with the exception of the lining of the opercle and the outer half of branchiostegal membranes, which are dusky. This is the Pacific representative of the Atlantic *Triglops pingeli*, from which it differs in the greater slenderness of the body, particularly of the caudal peduncle, in the somewhat smaller eye, the more pointed snout, the less fine subdivision of the lateral folds, the less complete investment of the fins with prickly scales, and, above all, in the peculiar coloration of the male. Alaska to Puget Sound; taken very abundantly by the *Albatross* at stations located both north and south of the Aleutian Islands and in Bristol Bay; also from about St. Paul Island in 24 to 37 fathoms, off Karluk in 31 fathoms, and off Robben Island in 18 fathoms, and by Mr. Starks in Puget Sound, the depths ranging from 10½ to 42 fathoms; specimens 82 to 140 mm. in length. (Gilbert). (Named for Dr. Tarleton Hoffman Bean.)

Triglops pingeli, BEAN, Proc. U. S. Nat. Mus. 1883, 355; not of REINHARDT.
Triglops beani, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 428, pl. 28, fig. 2, Aleutian Islands, Bristol Bay, at Albatross Stations 3214, 3217, and many others, in 7½ to 42 fathoms.

2302. TRIGLOPS SCEPTICUS, Gilbert.

Head 3⅓ to 3½; depth $5\frac{2}{7}$ to 5½. D. XI–21 to 23; A. 22 to 24; P. 19 (18 on left side in 2 specimens); V. I, 3; C. 12–12–12; lateral line 46 or 47; branchiostegals 6. Body very robust, the upper profile descending rapidly from front of dorsal in a regular curve to tip of short snout; least depth of caudal peduncle 4¼ to 4¾ in its length from base of last anal ray. Head of moderate length, its width 1⅘ to 2 in its length; maxillary reaching to or nearly to vertical from middle of pupil, 2¼ to 2½ in head; mandible slightly projecting. Teeth on jaws and vomer, none on palatines; 2 blunt spines on occiput. Eye very large, 1½ times the interorbital width, and 2½ in head. Preopercle armed with 5 small spinous points, the upper one pointing upward and backward, the second and third backward, and the lower 2 pointing forward; opercle ending in a triangular spine. Branchiostegal membranes broadly united, free from the isthmus posteriorly. The upper part of the body and the top and sides of head, including all of cheek, the lower, anterior, and upper parts of eye, and exposed portion of the maxillary, thickly covered with prickly plates, much larger, more spinous and scale-like than in *Triglops pingeli*, and on sides loosely arranged in series. Spines and rays of dorsals, caudal, and pectoral fins covered with series of prickles nearly to their tips, except the lower thickened rays of pectorals, which are naked; a row of enlarged plate-like scales along the lateral line, becoming very indistinct posteriorly, more numerous and less distinct than in *Triglops pingeli*, 38 in number to opposite the last ray of second dorsal; a similar series along the base of dorsal fins, ending opposite the posterior part of second dorsal; lower half of body crossed at short intervals by transverse undulating folds of skin, about 180 in number, the edge of each fold with small rough scales causing it to appear sharply and finely serrate, these scales much larger and more spinous than in *Triglops pingeli*, these of successive folds meeting and overlapping; the folds reaching from lateral line quite to the anal fin, and behind the anal completely encircle the caudal peduncle. In *Triglops pingeli*, the space along the anal and the lower sides of caudal peduncle is naked. Dorsal fins not connected, the membrane from last dorsal spine connecting with extreme base of first soft ray; spinous dorsal higher than soft dorsal, the dorsal spines contained 2⅓ times in length of head; rays and spines slender; base of anal equal in length to that of second dorsal, a little more than ⅓ length of body; caudal truncate, with a number of short auxiliary rays above and below, and 12 fully developed rays, each of which is twice bifurcate; pectorals reaching beyond front of anal, the longest ray 1⅓ to 1⅗ in length of head, the lower rays enlarged and exserted, forming a distinct lobe, some of the rays of which are longer than the upper part of the fin; ventrals reaching beyond vent, very narrow at base, inserted close together, the outer ray not provided with the broad membranaceous flap present in *Triglops pingeli*. Color olivaceous above, light yellow with more or less silvery on sides of head and belly; traces of 4 saddle-shaped bands of darker color reaching across back and below lateral line; 1 under first dorsal, 2 under second dorsal, and 1 on back of caudal peduncle; more or less of the outer portion of gill membranes black, edged posteriorly with white; gill cavity black and roof of mouth dusky; dorsal and caudal fins indistinctly blotched with black, the blotch on the dorsal corresponding more or less closely to the bars on the back; a large black blotch on upper part of pectoral and on side of body just above axil: peritoneum silvery grayish. Very closely related to *Triglops beani* and *Triglops pingeli*, but differing in the following respects: The eye is much larger, the snout shorter, and the maxillary shorter and broader. The maxillary bone and the lower half of cheek are invested with prickles, not naked. The lower thickened portion of the pectoral fin is produced to form a lobe. The scales on the upper half of the body are much coarser. The dorsal series of enlarged prickles much less conspicuous. The lateral folds are much more numerous, averaging about 4 to 1 pore of the lateral line, reaching to or nearly to the anal fin and encircling the caudal peduncle below. The ventral fins are much narrower and nearer together. The lateral line has a much more pronounced upward curve over the base of the pectorals. A short, high occipital ridge is present, but does not terminate in a distinct spine. (Occipital ridge obsolete in *beani*, a bare trace of it sometimes visible). Aleutian Islands; several specimens, from 68 to 155 mm. in length, taken from south of Sannak and north of Unalaska Island, in 43 to 138 fathoms. (Gilbert.) (*σκεπτικός*, thoughtful, reflective, in reference to the appearance given by the large eyes.)

Triglops scepticus, GILBERT, Rept. U. S. Fish. Com. 1893 (1896), 428, pl. 28, fig. 2, Aleutian Islands, at Albatross Stations 3215, 3222, and others, in 43 to 138 fathoms.

721. STERNIAS, Jordan & Evermann, new genus.

Sternias, JORDAN & EVERMANN, new genus (*xenostethus*).

This genus is closely related to *Triglops*, differing chiefly in the scaly breast, which is not crossed by folds or mucous channels. Back and head coarsely scaled. Pacific. (*στέρνον*, breast.)

2303. STERNIAS XENOSTETHUS (Gilbert).

Head about 4⅕; depth 6; eye 3⅙ in head; snout 3¾. D. XI, 23; A. 23; P. 16; V. I, 3; lateral line 43; branchiostegals 6. Body shaped as in *Triglops pingeli,* rather heavy at shoulders, tapering gradually backward; caudal peduncle slender, its least depth 4¾ in its length, which is ⅔ length of head; upper profile of head descending rapidly in a strong convex curve, unbroken to tip of snout; mouth large, maxillary reaching vertical from middle of pupil, 2⅔ in head; interorbital space very narrow, ⅕ orbit, the orbital rim not elevated, the space neither grooved nor ridged; a pair of broadly rounded occipital ridges, not ending in spines; nasal spines short and inconspicuous, a broadly noticeable depression behind them; preopercle with 4 ill-defined projections, 1 between each mucous pore, but without definite spines; gill membranes as usual; pectoral rays apparently all simple, the lower ones thickened; prickles covering dorsal region and back and sides of head, unusually coarse and few in number; the usual series of enlarged prickles along either side of base of dorsals; folds below lateral line numerous, very oblique, 2 or 3 to each plate of the lateral line; on sides of abdomen anteriorly to vent, the prickly scales bordering the folds form a dense mass in which the linear arrangement is still faintly visible; breast covered with a very dense patch of similar scales, still more closely crowded; lower part of cheeks, opercles, and preorbital region naked. Very light grayish above, with the usual 4 cross bars, those under soft dorsal and on back of tail broader than usual; under parts whitish, becoming bright silvery on breast and belly; a series of irregular silvery white blotches along lower margins of the dorsal cross bars; pectorals dusky at base of upper and lower rays, with 2 convex dusky bars on distal half; snout and cheeks more or less dusky. This species differs widely from species of *Triglops* in the investment of the breast, which is without trace of folds and is covered by small, closely imbricated spinous scales, not arranged in series. In all other species of *Triglops* the breast is crossed by a few cutaneous folds similar to those on sides of body. In *S. xenostethus* the sides of the abdomen are covered similarly to the breast, but the scales are arranged in more or less evident series, some of which can be traced above into the cutaneous folds. The body is not slender, the lateral folds are not very numerous, and the scales on head and on upper part of body are very coarse. Length 1½ inches. Bering Sea; only the type known. (Gilbert.) (ξένος, strange; στῆθος, breast.)

Triglops xenostethus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 429, pl. 29, fig. 2, north of Unalaska, at Albatross Station 3220, in 34 fathoms. (Type in U. S. Nat. Mus.)

722. PRIONISTIUS, Bean.

Prionistius, BEAN, Proc. U. S. Nat. Mus. 1883, 355 (*macellus*).

This genus is allied to *Triglops,* differing in the following respects: The much slenderer form, the absence of a series of bony tubercles along the bases of the dorsal fins, the elongation of the exserted pectoral rays so that the lower portion of the fin is considerably longer than the upper, the presence of serrations on all the dorsal spines and on the first soft ray, and the emargination of the caudal fin. Alaska. (*πρίων*, saw; *ἱστίον*, sail, referring to the dorsal fin.)

2304. PRIONISTIUS MACELLUS, Bean.

Head $4\frac{1}{6}$; depth 8; branchiostegals 6. D. XI–29; A. 29; C. 11 (developed); P. 10+5; V. I, 3; lateral line 51. Body slender and elongate, its greatest height equaling length of lower jaw. The height at the ventrals equals $\frac{1}{2}$ of the distance of the pectoral from the tip of the snout, and is contained $8\frac{1}{2}$ times in the standard body length; caudal peduncle shorter than in *Triglops pingeli*, its least height equaling width of interorbital space; length of caudal peduncle, measured from end of anal fin to origin of middle caudal rays, 7 in length of body; no bony plates along the dorsal fins; lateral line with well-developed osseus tubercles, furnished below with ciliated scales similar to those of *Triglops pingeli;* the breast, however, unlike that of the species just named, is naked. The head agrees in the main with that of *Triglops pingeli*, but is not so deep nor so wide; the jaws are about equal in front. Greatest width of head slightly more than $\frac{1}{2}$ its length and $7\frac{1}{2}$ in body. Interorbital width, measured on the bone, about 3 in orbit, which equals the snout in length. On the top of head, close behind the orbits, are 2 short, interrupted furrows similar to those observed in some species of *Prionotus*. The length of the upper jaw is contained $2\frac{1}{3}$ times in that of the head, equals that of the postorbital part of the head, and is contained $9\frac{1}{2}$ times in the unit of length. The maxillary extends nearly to the vertical through the middle of the eye, the mandible nearly to that through the posterior margin of the eye. The length of the mandible is about $\frac{1}{2}$ that of the head. The dentition is the same as in *Triglops pingeli*. The length of the eye equals that of the snout, and is contained $3\frac{1}{2}$ times in the length of the head. The branchiostegal membrane is not very deeply emarginate, and is free from the isthmus; slit behind fourth gill a little more than $\frac{1}{2}$ as long as the pupil; gill rakers on the anterior arch quite rudimentary, their length being rather less than their width, 8 below the angle. Distance of spinous dorsal from tip of snout equals that of pectoral from same point, and is $4\frac{1}{4}$ in body; base of this fin twice as long as longest ray of soft dorsal; length of first spine equals that of first ray of soft dorsal, and is contained $3\frac{1}{3}$ times in that of head; fourth spine longest, its length being contained $2\frac{1}{2}$ times in that of head; last spine very little more than $\frac{1}{3}$ as long as first; first spine serrated along lower $\frac{1}{3}$ of its anterior edge, and all the following spines, except the last, are similarly armed along the anterior edge of their exserted tips; even the first ray of second dorsal is thickly set with minute spines; length of base of soft dorsal $2\frac{1}{5}$ times in body; its first ray equal to longest anal ray or the first spine, which equals distance from snout to orbit; fourth, fifth, sixth, and seventh rays longest and about equal in length, twice as long as last ray and $\frac{1}{5}$ as long as soft dorsal base; membrane behind last dorsal spine extending to base of first soft ray; origin of anal fin vertically beneath base of second soft ray, the distance of the anal origin from the snout less than length of anal base; length of first anal ray equals least height of tail and is slightly more than $\frac{1}{2}$ that of fifth to eighth, which are longest, the last ray $\frac{1}{2}$ as long as orbit; vent nearly midway between origin of ventrals and that of anal; caudal distinctly emarginate when fully expanded, the length of middle rays 9 times, and that of the external rays $7\frac{7}{10}$ times in length of body. The structure of the pectoral is similar to that in *Triglops pingeli,* but the longest of the exserted lower rays extends considerably farther back than the upper portion of the fin. The origin of the pectoral is directly under that of the spinous dorsal. The length of the longest exserted ray (eleventh) is contained $4\frac{1}{2}$ times in the standard body length. Five of the lower pectoral rays are modified. The tenth pectoral ray, which is the longest of the non-exserted portion, is only about $\frac{5}{6}$ as long as the eleventh and extends to near the end of the spinous dorsal. The ventral is situated farther in advance than in *Triglops pingeli,* and does not quite reach to the vent when extended. Its length is contained nearly 12 times in the unit of length. Colors: There are traces of the same $\frac{1}{2}$ bars which ornament the back and sides of *Triglops pingeli,* but the dorsal portion of the markings is very faint and the lower limits of the dark areas are the most intense and form a succession of elongate blotches along the median line of the body, partly below and partly on the lateral line; dorsal fins with 3 series of dark spots on the rays and spines, but not on the connecting membrane; these spots forming broken bands which are oblique on the first dorsal and nearly horizontal on the soft dorsal when the fins are raised; a crescent-shaped broken band crosses the top of the body at the ninth dorsal spine; a short, dark blotch near the root of the pectoral on the tenth, eleventh, and twelfth rays; another dusky blotch in the upper axil of the pectoral; 4 dusky bars on the pectoral, the first of which is very short, involving only about 5 of the rays, the second and third extending to the first exserted ray, and the fourth, which is near the tip of the fin, extending on the 7 upper rays only; caudal dusky at the base and with 4 bars, the first of which is faint in the middle and the last interrupted by the emargination of the fin; lips and upper portion of the maxilla dusky; a dark blotch on the interoperculum; membrane lining the inner surface of the operculum dusky; ventrals and anal whitish. Length 172 mm. (Bean.)

Concerning this species Dr. Gilbert observes:

"The elongation of the lower exserted pectoral rays, and the 'serrations' (i. e., minute spinous scales) on the fin rays, are characters which *Prionistius* shares with related species of *Triglops.* The slenderness of the body, the emargination of the caudal fin, and the elongate dorsal and anal fins are present and the two former carried to an extreme in *Elanura forficata.* In addition to these characters, *Prionistius* has the breast naked and the dorsal region without the usual series of enlarged plates."

Three specimens, 77 to 87 mm. long, were secured at stations south of Sannak and north of Unimak Islands, Alaska, at 38 and 56 fathoms. The ventral fins seem to be not more advanced in position than in the other species. In other respects these specimens agree well with Bean's admirably full description. Aleutian Islands, south to British Columbia; not rare. (*macellus,* diminutive of *macer,* slender or thin.)

Prionistius macellus, BEAN, Proc. U. S. Nat. Mus. 1883, 355, Carter Bay, British Columbia (Types, Nos. 31958 and 33793, U. S. Nat. Mus. Coll. Capt. H. E. Nichols); GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 431.

723. ELANURA, Gilbert.

Elanura, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 429 (*forficata*).

This genus is nearly related to *Prionistius*, from which it differs in the presence of a series of enlarged scutes along each side of base of dorsal fins, in the presence of spinous cross folds on the breast, and in the very deeply forked caudal fin. Preopercular spines 4, the lower 3 developed as thin, flat lobes. From *Triglops* it differs in the forked caudal, in the great elongation of the body, and the lengthened dorsal and anal fins. It agrees with *Triglops* and *Prionistius* in all other important structural details, including the exserted, more or less produced lower pectoral rays. Alaska. (*Elanus; ἠλανός*, a kite; *οὐρά*, tail, from the long caudal fin.)

2305. ELANURA FORFICATA, Gilbert.

Depth $6\frac{7}{8}$ to $7\frac{4}{5}$. D. XI–29 or 30; A. 30 to 32; P. 21; C. 11; V. I, 3; lateral line 54 to 56; branchiostegals 6. This species is most closely related to *Prionistius macellus*, with which it agrees in its extreme elongation, in the production of its exserted pectoral rays, and in the investment of the spines and rays of dorsal and caudal and pectoral fins, with series of minute prickles (not "serrations"). The caudal fin is very widely forked, not merely emarginate as in *Prionistius macellus*, the dorsal series of spinous scutes is present, and also the customary plates on the breast. The ventrals occupy the position usual in the genus and extend well beyond the vent. The interorbital region is a wide, shallow groove, unlike the narrow space in *Prionistius macellus*, there is a naked streak on cheek following the lower line of the suborbital stay, and the coloration is peculiar. Extremely elongate, heaviest at the shoulders, tapering slowly and regularly backward, the ventral region often distended; depth of body equaling, or nearly equaling, length of snout and eye; length of caudal peduncle, from last anal ray to base of median caudal rays, varying from $\frac{5}{6}$ to $1\frac{1}{6}$ times length of snout and eye; body everywhere compressed, slightly deeper than wide, the greatest width and depth of head about equal; depth of caudal peduncle greater in females than in males, averaging $\frac{3}{7}$ diameter of eye in the former, $\frac{2}{5}$ eye in the latter. Occipital region of head nearly square in cross section, tapering regularly. A pair of inconspicuous low ridges diverging from behind eye, and a pair of cross grooves, 1 immediately behind eyes, the other on middle of occiput, hardly noticeable in the young; supraocular rim protruding laterally, anteriorly and posteriorly, deeply incurved above middle of eye; interorbital space wide, evenly concave, its greatest width over front of eye equaling length of snout, its least width $\frac{1}{2}$ diameter of orbit; snout sharp, with greatly convex upper profile showing a faint transverse groove behind nasal spines, its length less than diameter of eye, $3\frac{1}{2}$ to $3\frac{5}{6}$ in length of head; mouth slightly oblique, reaching a vertical halfway between front and middle of pupil, $2\frac{1}{3}$ (in young) to $2\frac{1}{2}$ in length of head; eye $3\frac{1}{10}$ (in young) to $3\frac{1}{5}$ in head. Gill membranes widely joined, free from the isthmus; a well-developed slit behind last gill; nasal spines minute, as in *Prionistius macellus*, barely visible; upper preopercular spine short and simple, 3 lower ones developed as thin rounded lobes, irregularly serrate or spinous. Squamation as usual in *Triglops;* the body above the lateral line and the top and sides of head thickly covered with small spinous scales; lower side of head, including the lower parts of cheek and preopercle, and a narrow strip along lower half of preorbital, the suborbital ring, and the suborbital stay naked; the series of slightly enlarged dorsal scutes very irregularly developed, the plates varying from 14 to 34, in 6 specimens counted. Lateral line slightly depressed above axil of pectorals, thence ascending by a gently convex curve, sometimes nearly straight, with 54 to 56 scutes of the usual character, having undulating folds descending obliquely from the posterior margins; numerous secondary folds also present, averaging about 2 to each scute of the lateral line, the total number of folds counted along lower half of sides being, in adults, about 135; anterior base and axil of pectorals and a strip encircling breast in front of ventral fins naked, the breast with a few (5 to 10) transverse folds similar to those on sides; the lateral folds leave a wide naked strip along base of anal fin and do not encircle caudal peduncle below. Dorsal spines long and extremely slender, the longest $2\frac{1}{4}$ to $2\frac{1}{2}$ in head, the 2 fins separate, the membrane of the last spine extending to base of first soft ray; soft dorsal very long, its base $2\frac{1}{4}$ to $2\frac{2}{9}$ in length, ending slightly in advance of last anal ray; base of anal $2\frac{1}{5}$ to $2\frac{1}{8}$ in length; anus anterior in position, nearly midway between axil of ventrals and front of anal; ventrals inserted in the usual position, their distance from snout $3\frac{3}{4}$ or 4 in length. Along their outer margin they are provided with a wide cutaneous fold, as in *Triglops beani.* They extend well beyond the vent, in male, or nearly to the front of anal; pectorals usually with 21 rays, the lower 7 simple, thickened, exserted, 2 or 3 of them often as long as, or longer than, the branched rays above, the fin thus appearing notched or lobed; longest rays extending well beyond front of anal and contained $1\frac{1}{4}$ to $1\frac{1}{7}$ times in head; caudal fin very sharply and deeply forked, especially in male examples, where the median rays are but $\frac{1}{2}$ the length of the longest ones; the caudal varies in length from $\frac{5}{6}$ length of head (in males) to $\frac{2}{3}$ length (in females), and contains 11 rays, the lowermost (corresponding to the uppermost developed ray) shortened and unbranched, as usual in *Triglops.* Coloration similar in the two sexes: Light brownish (in spirits) above, the back crossed with the usual 4 saddle-shaped blotches, the first one broad, under the first 7 or 8 dorsal spines, the second narrow, under the fifth to the tenth rays of second dorsal, the third and fourth very narrow, under last dorsal rays and on back of caudal peduncle; between the second and third bars are 2 or 3 similar fainter ones equally dividing the interspace; the bars are continued to below the lateral line, where they immediately fork, giving rise thus to a series of vertical dark blotches mostly arranged in pairs; the interspaces between some of the anterior pairs with a bright silvery spot;

underside of head and body whitish, the breast and anterior part of belly more or less silvery; lining of opercle jet-black, the color descending onto the uppermost branchiostegal rays; an ill-defined dark blotch below eye, from which runs a narrow streak along preorbital to front of snout, where it crosses upper lip; lower lip black, except laterally; no distinct markings on basal portion of pectorals, a small faint spot at base of its upper rays, and a number of very faint bars sometimes visible in females; males with 2 conspicuous jet-black bars crossing terminal half of the lower thickened pectoral rays; tips of the narrow caudal lobes jet-black, no other markings visible. Aleutian Islands; several specimens, from 115 to 245 mm. long, from stations south of Sannak and north of Unimak islands, at depths of 38 to 50 fathoms. (Gilbert.) (*forficatus*, deeply forked, like shears.)

Elanura forficata, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 430, pl. 30, fig. 1, Aleutian Islands, at Albatross Stations 3213, 3214, and 3222, in 38 to 50 fathoms.

724. MELLETES, Bean.

Melletes, BEAN, Proc. U. S. Nat. Mus. 1879, 354 (*papilio*).

Body moderately elongate. Head broad, depressed, rounded in front, naked, with several cutaneous flaps; jaws, vomer, and palatines with bands of villiform teeth; preopercular spines simple, rather strong; gill membranes broadly connected, free from the isthmus; a slit behind the last gill; a narrow band of ctenoid scales along sides of back, meeting in front of dorsal; a few prickles on anterior parts of body, and some small dermal flaps on sides; skin otherwise naked; dorsals connected; the spinous dorsal long, not emarginate; pectorals well developed, the rays all simple; ventrals very long, I, 4, the inner surface of the rays armed with stiff setæ; pyloric cæca 6; no air bladder. Alaska. (μελλητής, a loiterer; remaining in shallow pools as the tide recedes.)

2306. MELLETES PAPILIO, Bean.

Head 2⅔; branchiostegals 6. D. XI–I, 20; A. 17; C. 11 (developed rays); P. 17; V. I, 4. Body moderately elongate, rather slender, somewhat compressed posteriorly; narrow band of scales close to its dorsal outline, otherwise naked, with the exception of a few prickles on sides. Head naked; 2 small cutaneous appendages on chin, 1 near the end of each maxillary, 2 above eyes, 2 on the vertex, and 1 near the upper angle of each gill opening; branchiostegal membrane free from the isthmus posteriorly. The greatest height of body is ¼ its length, and equals the length of the external caudal rays, its height at the ventrals contained 4⅓ times in length. The least height of tail equals the distance between eyes and the length of the antecedent spine of the second dorsal. The length of the caudal peduncle, measured from the end of the second dorsal to the origin of the middle caudal rays, equals ½ the length of the maxillary. Head equals twice the length of the mandible, its greatest width equals the length of the base of the spinous dorsal; distance between eyes 3 times in length of second and third dorsal spines; length of snout, or distance from end of snout to orbit, equals long diameter of eye and ½ length of upper jaw; length of maxillary equals twice length of caudal peduncle, and ½ length of anal base; mandible 2 in head, or 5½ body. There are 2 obtuse spines on the snout, 2 above the posterior parts of the orbits, and 2 on the vertex, the last 4 being provided with short filaments, none on the spine of the snout. There are 2 minute, barbel-like filaments on the chin, and there is 1 short cutaneous tag close to the end of each maxilla and on the membrane at the upper angle of the gill opening. The distance of the spinous dorsal from the snout equals 2½ times the length of its first spine, its length of base equals the greatest width of the head. The second and third dorsal spines are equal, their length being contained nearly 5 times in the length of the body; fourth dorsal spine longest, its length 4½ in body; fifth dorsal spine 5 times in body; last dorsal spine shorter than the antecedent spine of the second dorsal; longest ray of second dorsal ½ as long as distance of pectoral from snout, the last ray ½ as long as the antecedent spine; distance of the anal from the snout nearly twice that of the spinous dorsal from the same point; length of the anal base twice that of the maxillary; longest anal ray twice as long as the last; tips of the anal rays free from the membrane, some of them for a distance equal to ½ the diameter of the orbit; length of the middle caudal rays 4¼ times in that of the body, the length of the external rays, 4 times; length of the longest pectoral ray nearly twice that of the fifth dorsal spine, extending to vertical through the root of the sixth anal ray; distance of ventral from snout equals 3 times the long diameter of the orbit; length of longest ventral ray nearly ½ that of the body, extending to vertical through the root of the seventh anal ray; tips of the rays extending beyond the membrane, in one case about ⅓ of the length of the fin; ventrals furnished with stiff setæ on their under surface, following the course of the rays. Color: The ground color of the upper part of the body is a light grayish brown, on which are 4 markings of a darker brown, of which the first 3 are band-like and extend below the lateral line, while the fourth is widest below and sends only a narrow point below the lateral line; between the third and fourth large body markings there is a small blotch of similar color beginning at the lateral line and extending downward a distance equal to about ⅓ the long diameter of the orbit; at the base of the caudal is a band-like marking similar in color to the body markings, and the posterior half of the caudal bears 2 obscure bands of brown; between the brown markings there is an area of yellowish white; top of head sienna brown; cheeks brown, of a darker tint than the rest of the head; lower parts of head yellowish white, as are the bases of the pectoral and the anterior part of the belly; lower parts of the body grayish white, dotted here and there with spots of milky white, largest of these milky-white spots is not more than ⅐ as long as the orbit; belly with some similar spots, resembling in this respect the male of *Myoxocephalus grœnlandicus*, but the spots are much smaller than in that species; spinous dorsal mainly very dark brown, with 2 light areas in its anterior and posterior parts; second, third, and fourth body markings continued upon the soft dorsal; that proceeding from the fourth body marking, however, is continued forward, forming a margin for the upper posterior part of the soft dorsal; ground color of the pectoral a grayish brown; on this ground color the upper portion of the fin, on its anterior surface, has several bands of milky white bordered with sienna brown; the lower part of the anterior surface mottled with nearly linear markings of sienna brown bordered with milky white; the markings of the posterior surface of the pectoral corresponding in the main with those of the anterior surface, but the tips of the membrane between many of the rays are milky white; ventrals streaked and spotted with sienna brown and milky white on both surfaces, the membrane close to the third ray having a regular alternation of these brown and white spots; anal grayish brown sparsely mottled with spots similar to those on the ventrals; peritoneum silvery white. The length of the intestine is equal to the distance from the tip of the snout to the end of the anal fin. The genital papilla is short, about equal to the opening of the vent. Pribilof Islands. Known from 1 specimen, length 185 mm. (Bean.) (*papilio*, butterfly.)

Melletes papilio, BEAN, Proc. U. S. Nat. Mus. 1879, 354, St. Paul Island, Pribilof Group (Type, No. 23751, U. S. Nat. Mus. Coll. Henry W. Elliott); JORDAN & GILBERT, Synopsis, 716, 1883.

725. HEMILEPIDOTUS, Cuvier.

(IRISH LORDS.)

Hemilepidotus, CUVIER, Règne Anim., Ed. 2, Vol. II, 165, 1829 (*hemilepidotus*).
Temnistia, RICHARDSON, Fauna Bor.-Amer., III, 59, 1836 (*ventricosus*).

Body with 2 broad bands of rough scale-like plates on each side, 1 along the side of the back, 1 along the lateral line, the upper bands meeting anteriorily in front of dorsal; scales roundish, their upper and posterior margins free; skin otherwise naked, the naked skin thick and firm; head naked. Villiform teeth on jaws, vomer, and palatines. Top of head rugose, the ridges low, without spines, no spines on supraorbital rim. Branchiostegals 6. A small slit behind fourth gill; gill membranes joined to the isthmus anteriorly but forming a rather broad fold across it; preopercular spines simple, strong. Dorsal fins connected, the first long, with strong spines, emarginate, the first 3 spines shorter than those which follow; ventrals I, 4. North Pacific, in shallow water. (ἡμι, half; λεπιδωτός, scaled.)

a. Throat and belly pure white, or pale yellow. D. III, VIII, 21; A. 17. JORDANI, 2307.
aa. Throat and belly profusely spotted with black. D. III, VIII, 19; A. 15. HEMILEPIDOTUS, 2308.

2307. HEMILEPIDOTUS JORDANI, Bean.

(IRISH LORD; YELLOW SCULPIN.)

Head 3; depth 4¼. D. III, VIII, 21; A. 17; V. I, 4; eye 3 in head; pectoral 3⅗; ventral 1½; third dorsal spine 3; caudal 1⅖. Body rather robust anteriorly, tapering into a slender caudal peduncle; mouth moderate, the maxillary reaching to middle of eye; lower jaw included; villiform teeth on jaws, vomer, and palatines; interorbital deeply concave, about ⅗ eye; a flap of skin above posterior margin of eye, 1 on check, a couple at tip of lower jaw, 1 on end of maxillary, 1 at each side of nape; top of head corrugated but without spines. A band of scales along back, in 4 series anteriorly, 1 or 2 posteriorly; a naked area between this band and lateral line of about the same width; a series of scales along lateral line, 2 series along the mesial third of its length; below lateral line a band of scales in 7 or 8 series, becoming scattered and embedded under pectorals. Fins greatly elavated in the males; origin of dorsal over base of pectorals, the first 3 spines subequal, the other anterior spines much longer, but slightly shorter than soft rays; tip of pectorals reaching to below the fourth soft ray of dorsal; ventrals inserted slightly behind them; their tips reaching vent; caudal subtruncate. Color creamy white, mottled with dark brown; the mottlings forming irregular cross bars; some irregular radiating lines from eye; ventrals white in the female, dusky or speckled in the male; other fins with wavy dark cross bars and spots; lower parts largely bright yellow in life. Here described from specimens from Alaska at *Albatross* Station 3291. Length 12 to 25 inches. Bering Sea, very abundant south to Unalaska and east to Kadiak; much valued by the Aleuts as a food-fish, although rather coarse; specimens secured at Captains Harbor, Unalaska, St. Paul Island, Bering Island, Unga, Karluk, and at *Albatross* Station 3635 off St. George Island in 24 fathoms. Characterized by its comparatively plain coloration, the pale parts being largely bright yellow in life, wider and shallower interorbital space, smoother side of the head, and longer dorsal and anal. All specimens examined have dorsal XI, 21; A. 17. At anterior and posterior ends of occipital ridges are centers around which radiate very coarse broken striæ, contrasting with the finer granulations of *H. hemilepidotus*, which are also disposed in radiating lines. The males differ from females in the great development of all the fins, the higher flaps on head, and the presence of more yellow on jaws and branchiostegal region. The general color of body and upper fins is dull olive mottled with bluish, the ventral fins and sides of belly often obscurely speckled, the under parts translucent white in spirits but largely bright yellow in life. (Named for David Starr Jordan.)

Hemilepidotus jordani, Bean, Proc. U. S. Nat. Mus. 1881, 153, Unalaska (Type, No. 27598, U. S. N. M. Coll. Sylvanus Bailey); Gilbert. Rept. U. S. Fish Comm. 1893 (1896), 431; Jordan & Gilbert, Fishes Bering Sea, in Rept. Fur Seal Invest. 1896, 1897 MS.

2308. HEMILEPIDOTUS HEMILEPIDOTUS (Tilesius).

(Red Sculpin.)

Head 2½; depth 3¼. D. III, VIII, 19 or 20; A. 15; eye 4½ in head; third dorsal spine 3; third dorsal ray 2⅓; pectoral 1⅖; ventral 1½; caudal 1½. Body robust, not depressed; head large; interorbital space deeply concave, its width ⅔ diameter of the large eye; occipital ridges low and broad; bones of top of head extremely rough, but without spines, naked but with radiating striæ; small flaps over posterior part of eye, at occiput, over opercle, and on cheeks, maxillary, preopercle, mandible, and tip of snout; mouth moderate, the maxillary reaching to below posterior margin of eye. Jaws subequal; villiform teeth in broad bands on jaws, vomer, and palatines. Skin thick and firm; gill membranes forming a moderate fold across the isthmus; upper band of scales of about 4 rows, narrower than the interspace; first 3 spines of dorsal about equal, lower than those following; soft dorsal high. Olivaceous or reddish, more or less mottled and barred with darker; belly and lower parts pale, profusely covered with small blackish spots; fins all more or less speckled; skin joining bones of jaws finely spotted with black. Length 18 inches. Kamchatka to San Francisco; abundant from Puget Sound to Sitka; not common in Bering Sea. Smaller than *Hemilepidotus jordani* and much more varied in color. Here described from a specimen 9 inches in length, from Puget Sound.

Although much less abundant in Bering Sea than *H. jordani*, this is the only species which came into the hands of the older writers. The *Cottus trachurus* of Pallas, *Blepsias ventricosus* Eschscholtz, *H. tilesii* Cuvier & Valenciennes, and *H. gibbsi* Gill, all belong here. In addition to the striking differences in color, *H. hemilepidotus* is distinguished by the much narrower and deeper interorbital space and the more extensive granulations of the bones of the head in adults. The occipital and temporal ridges are more elevated, the granulations finer, extending onto upper portion of opercle, suborbital ring, and bony bridge across cheek. The opercular rib and the suborbital stay are smooth or faintly striate in *H. jordani*. The vertical fins are constantly shorter and lower than in *H. jordani*, the formula, D. XI, 19, A. 15, being constant in all specimens examined. (*ἡμιλεπιδωτός*, half-scaled.)

Cottus hemilepidotus, Tilesius, Mém. Ac. Petersb., III, 1810, 262, Petropaulski; based on *Myoxocephalus cornutus*, Steller MS., 1741.

Cottus trachurus, Pallas, Zoogr. Ross.-Asiat., III, 138, 1811, Kuril Islands. (Coll. Capt. Joseph Billings.)

Hemilepidotus tilesii, Cuvier & Valenciennes, Hist. Nat. Poiss., IV, 276, 1829; after Tilesius and Pallas; Günther, Cat., II, 173.

Blepsias ventricosus, Eschscholtz, Zool. Atlas, 3d Heft, 14, t. 13, 1829, Norfolk Sound and Sitka. (Coll. Capt. Kotzebue.)

Hemilepidotus gibbsii, Gill, Proc. Ac. Nat. Sci. Phila. 1862, 13, Northwest Boundary Survey; no definite locality given. (Coll. Dr. Suckley.)

Hemilepidotus trachurus, Jordan & Gilbert, Synopsis, 715, 1883.

Temnistia ventricosa, Richardson, Fauna Bor.-Amer., Fish., 59, 1836.

726. CALYCILEPIDOTUS, Ayres.

Calycilepidotus, Ayres, Proc. Cal. Ac. Sci., I, 1855, 76 (*spinosus*).

This genus is very close to *Hemilepidotus*, from which it differs in the broad union of the gill membranes to the isthmus, the skin not forming a fold across it. The skin of the body is thin and lax and the single known species is much smaller and less robust than the species of *Hemilepidotus*. The form of the upper surface of the cranium is also different. The ridges on head are prominent, broken up into rough irregular spines; posterior part of supraorbital rim very rough and uneven. (*κάλυξ*, cup; *λεπιδωτός*, scaled.)

2309. CALYCILEPIDOTUS SPINOSUS, Ayres.

Head 2¾; depth 5. D. III, VIII, 19; A. 15; scales 60; eye 4⅓ in head; maxillary 2⅓; fourth dorsal spine 4; pectoral 1½; ventral 2; caudal 1⅚. Body rather elongate, depressed; head broad, somewhat concave between the occipital ridges; 2 sharp radiating ridges behind upper posterior margin of each orbit, somewhat broken up into irregular spines; posterior part of supraorbital rim broken up into spines; top of head covered with loose skin, and with thick-set mucous tubes; interorbital space narrow, concave, ½ diameter of eye; preopercle with 2 strong, shortish, diverging spines above; fleshy slips above opercle, near upper posterior part of eye, and at occiput; a long fleshy slip on maxillary, and 4 on lower jaw; many scales on sides with small flaps; skin, where not scaly, thin and lax; dorsal band of scales with about 7 rows at its widest part, anteriorly much wider than the space between it and the lateral band; isthmus rather broad, the membranes not forming a fold across it; dorsal fins considerably connected, spines very low, the highest about ⅔ the height of the soft rays; pectorals broad, shortish, about reaching vent; distance from spinous dorsal to snout greater than length of pectoral. Color brown, mottled and obscurely barred, often tinged with red; top of head usually with brick red; fins all, except ventrals, mottled with blackish and reddish; skin joining bones of jaws unspotted; belly whitish, immaculate. Here described from a specimen from Monterey Bay, California, 10 inches in length. Coast of California, in rather deep water; not common; known only from about Monterey and San Francisco. (*spinosus*, spiny.)

Calycilepidotus spinosus, AYRES, Proc. Cal. Ac. Sci., I, 1855, 76, San Francisco.
Hemilepidotus spinosus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 134; GIRARD, U. S. Pac. R. R. Surv., X, Fish., 68, 1858; JORDAN & GILBERT, Synopsis, 715.

727. ENOPHRYS, Swainson.

(STONE SCULPINS.)

Enophrys, SWAINSON, Class'n Fishes, II, 271, 1839 (*claviger*).
Aspicottus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 130 (*bison*).
Clypeocottus, AYRES, Proc. Cal. Ac. Sci. 1854, 12 (*robustus*).

Body short and thick, depressed anteriorly. Head very large, mailed above with rugose, bony plates; a series of large, rough, bony plates along lateral line; no scales. Teeth in villiform bands in jaws and on vomer, none on palatines; preopercle with strong, straight spines; suborbital stay broad, externally bony; gill membranes joined to the isthmus, not forming a fold across it; a slit behind fourth gill. Dorsal fins separate, the anterior short, not notched; anal short. Intestinal canal elongate. Herbivorous, feeding chiefly on algæ. (ἐν, on; ὀφρύς, eyebrow.)

ASPICOTTUS (*ασπίς*, shield; *Cottus*):
  a. Preopercular spine about ⅓ head, reaching end of opercle or a little beyond; bony plates of side without keel or spine. BISON, 2310.
ENOPHRYS:
  aa. Preopercular spine very long, reaching middle of spinous dorsal; bony plates of sides each with a serrated keel or spine. CLAVIGER, 2311.

Subgenus ASPICOTTUS, Girard.

2310. ENOPHRYS BISON (Girard).

Head 2½; depth 4. D. VIII, 11; A. 9; lateral plates 29; eye 5 in head; maxillary 2½; pectoral 1⅗; ventral 2¼; caudal 2; snout blunt; maxillary reaching beyond pupil; external bones of head rough granular; interorbital space elevated and concave, the orbital ridge without spine; suborbital stay covering most of cheek; a ridge extending backward from each eye, the two connected by a cross ridge at occiput; the ridges large and rough, and the space between them concave; preopercle with 4 spines, the upper very long, straight, and rough, usually reaching past opercle, a little more than ⅓ head; opercular ridge very broad; subopercle with 2 diverging spines; a single series of large, rough, granular plates along sides, from opercle to base of caudal, the plates without keel or spine and growing smaller behind; spinous dorsal small, much lower than soft rays; anal short. Olivaceous above, variegated with blackish and reddish, yellowish below; fins olivaceous, marked with black; ventrals pale. Length 12 inches. San Francisco to Sitka; very abundant, especially about Puget Sound; a coarse species, not used for food. When disturbed it extends its long preopercular spines, making the head flat and very wide. Here described from a specimen, 4 inches in length, from Puget Sound, Washington. (*Bison*, the American buffalo, from its horns.)

Aspicottus bison, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 130, Fort Steilacoom (Type, No. 322, U. S. Nat. Mus. Coll. Dr. Suckley); Fort Point (No. 323. Coll. Lieutenant Trowbridge); San Francisco (No. 324. Coll. Dr. Heermann); Tomales Bay (No. 325. Coll. E. Samuels.)

Clypeocottus robustus, AYRES, Proc. Cal. Ac. Sci. 1854, 12, San Francisco.

Aspicottus bison, GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 66, 1858.

Enophrys bison, JORDAN & GILBERT, Synopsis, 710, 1883.

Subgenus ENOPHRYS.

2311. ENOPHRYS CLAVIGER (Cuvier & Valenciennes).

D. VI-13; A. 11; V. I, 3. Top of head everywhere rough; 2 strong nasal spines; superciliary margins much elevated, with a deep groove between them; 4 preopercular spines, the upper exceedingly long and strong, extending nearly to the vertical from end of first dorsal, serrated and coarsely toothed on its upper margin, but without antler-like processes; "occiput with a very long cuneiform process on each side;" lateral line with bony plates, rougher than in *Enophrys bison*, each with a serrated keel and spine; skin subvillous above, with small rough warts; a series of small cutaneous appendages above the anal; suborbital stay spinous; vomerine teeth present; isthmus broad; slit behind last gill large. Dark brown, with 3 or 4 vertical bands; belly white. Length 2½ inches. Bering Sea. Here described from the original type in the British Museum.

Dr. Gilbert mentions also: A single specimen, 52 mm. long, from Albatross Station 3233, Bristol Bay, Alaska; depth 7¼ fathoms. The upper preopercular spine is long and very slender, extending to below middle of spinous dorsal, bearing small serrations on anterior and posterior edges of basal half, but without larger teeth or accessory spinules. Area above lateral plates thickly beset with minute prickles; posterior part of abdominal region and the area above anal fin similarly beset with prickles which scarcely project beyond the small tubercles in which they occur. A few larger postaxial prickles and a small number of white filaments scattered along middle of sides. Filaments also at base of preopercular spine and 2 or 3 at tip of maxillary. Dorsal VIII, 14; anal 11; lateral line 35.

A specimen, 151 mm. long, from *Albatross* Station 3645, off Robben Island, in 10 fathoms, is entirely similar to the one reported on by Gilbert. It may be described as follows: Preorbital with 2 strong spinous projections, which overlap the premaxillary in closed mouth. Interorbital space deeply channeled, the orbital rim raised posteriorly into a blunt spinous tubercle. A small, spinous, occipital tubercle, behind which rises a high, sharp nuchal ridge, which is highest posteriorly and has its upper edge finely toothed. No cirri on top of head. Upper preopercular spine long, simple, reaching beyond head to fourth or fifth plate of lateral line; below it 3 short, strong spines, the lowermost directed downward and forward; outer surface of the upper spine with 3 or 4 low, finely serrated ridges, its inner edge smooth, without accessory cusps or spinules; opercular ridge high, serrate; two sharp spines on anterior angle of subopercle; top and sides of head rough, with minute spinous points; preopercle and lower jaw with numerous short filaments, a longer one on end of maxillary. Body entirely covered with minute prickles, which invest also the abdominal region; those above lateral line longest and most thickly placed; lateral line with a series of plates similar to those in *E. bison*, each surmounted by a sharp spine; lateral line with 2 curves, approaching back most nearly at end of spinous and at end of soft dorsal; many conspicuous white filaments scattered over sides below lateral line. Dorsals entirely separate, the free interspace as wide as pupil. Head $2\frac{2}{3}$ in length; depth $3\frac{3}{5}$. Eye larger than interorbital width, $4\frac{3}{4}$ in head. D. VIII–14; A. 12 (11 in previously noted specimen); P. 16; lateral line with 35 plates. Dusky above, with faint, darker cross bars; light below; two black blotches on cheek; some faint dusky V-shaped prolongations of the coloration of the back down toward base of anal fin; fins indistinctly crossbanded; a dark area at base of pectoral, a narrow oblique dusky cross bar on base of caudal fin. (*claris*, key; *gero*, I bear.)

Cottus claviger, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 195, 1829, Kamchatka (Coll. M. Collée); GÜNTHER, Cat., II, 167.

Cottus elegans, GRAY, in CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 195, 1829; same type.

Enophrys claviger, JORDAN & GILBERT, Synopsis, 711, 1883; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 426; JORDAN & GILBERT, Fishes Bering Sea, 1897.

728. CERATOCOTTUS, Gill.

Ceratocottus, GILL, Proc. Ac. Nat. Sci. Phila. 1859. 165 (*diceraus*).

This genus is very close to *Enophrys*, from which it differs in having the long preopercular spine armed above with recurved hooks or antler-like processes. Bering Sea. (*κέρας*, horn; *Cottus.*)

a. Transverse occipital ridge not developed; interorbital groove deep and narrow; preopercular spines small. LUCASI, 2312.

aa. Transverse occipital ridge well developed; interorbital groove less deep and wider; preopercular spines larger. DICERAUS, 2313.

2312. CERATOCOTTUS LUCASI, Jordan & Gilbert, new species.

Head $2\frac{4}{5}$ in length, measured to end of opercular flap; depth $3\frac{1}{5}$. D. VII, 13; A. 12; P. 17 or 18. Eye $4\frac{3}{4}$ in head; maxillary $2\frac{1}{2}$; preopercular spine $2\frac{1}{2}$; pectoral fin $1\frac{1}{5}$. Maxillary reaching nearly to the vertical from posterior margin of eye; villiform teeth on jaws and vomer, the outer series in jaws enlarged; no teeth on palatines; interorbital space very deeply channeled, its least width $\frac{3}{5}$ diameter of eye; upper edge of orbital rim sharp and beset with a single series of small teeth; occiput abruptly depressed behind the eyes to below the floor of interorbital space, as in *C. diceraus*, nearly flat both transversely and longitudinally, the occiput ridges being very low, and the transverse ridge so conspicuous at back of occiput in adult *C. diceraus* is here not developed; nuchal ridges high, elevated, and compressed into a minutely serrated edge, a very small cusp-like elevation at their base anteriorly; nasal and preorbital spines as in *C. diceraus;* upper preopercular spines slender and somewhat decurved toward tips, minutely roughened on the outer surface, and bearing on their upper edge 3 retrorsely hooked spines, resembling the spines on a rose bush; below this 3 short, strong spines, the first immediately below the upper spine and diverging from it, the second directed nearly vertically downward, the third downward and forward; 2 strong diverging spines at anterior angle of subopercle; opercular ridge elevated; all exposed bones of head roughened with radiating series of lines which are beset with minute prickles; lateral line with 36 bony plates decreasing in size posteriorly, each plate bearing small slender spines, those on the middle of plate longer than the others and directed backward. From fragments of skin left on snout and side of head in 1 specimen, it is evident that this species is colored much as in *C. diceraus*, the ground color light olive, thickly covered with small dusky spots, around which the ground color forms narrow reticulating lines. When taken the bones of the head were a bright vitriol green. Bering Sea; 2 specimens, 135 and 132 mm. long; 1 taken from the stomach of a cod, the other from a halibut, both of which were captured near St. Paul Island. The skin is digested off from both specimens, so that the color can not be determined, but they are otherwise in good condition. Differing from *C. diceraus* in the deeper narrower interorbital groove and the smaller size and different armature of the preopercular spines. (Named for Mr. Frederick Augustus Lucas, Curator of Comparative Anatomy in the U. S. National Museum and member of the U. S. Fur Seal Commission in 1896 and 1897.

Ceratocottus lucasi, JORDAN & GILBERT MS., Fishes Bering Sea, 1896, 1897 MS., St. Paul Island (Type, No. 48234; Cotype, No. 5661, L. S. Jr. Univ. Mus. Coll. Jordan.)

2313. CERATOCOTTUS DICERAUS (Pallas).

D. VII, 14; A. 10; C. 12; P. 17; V. I, 3. Form of *Enophrys bison*, the head large, wider than deep or long; top of head nearly as in *Enophrys bison*, the ridges higher and very rough; orbital ridges elevated, continued backward toward the nape, the occipital ridges sharp behind; upper preopercular spine very long, rough, nearly ⅔ as long as head, with strong recurved hooks or serrations on the upper edge; lower preopercular spines strong; opercle with a longitudinal rib and no distinct spine; lateral line with a row of rough bony scutella, each with a minute central spine; skin above more or less villous or prickly, elsewhere smooth. Isthmus wide; a slit behind last gill; vomer with teeth. Bering Sea, rather common from Alaska to Kamchatka and Saghalin. Here described from a specimen in the British Museum, about 6 inches long.

Dr. Gilbert has this note on several adults taken with seine at Herendeen Bay, Alaska Peninsula:

There are 6 or 7 strong barbs inclined forward on upper surface of preopercular spine, which is very long, slender, and straight, reaching to below middle of spinous dorsal. Filaments arranged as in *Enophrys claviger*, but those on posterior part of body much more numerous. Anal papilla very large, 0.27 mm. in a specimen 195 mm. long. There seems to be no prickles on region above lateral line, or on abdomen. Stomachs filled with molluscan shells, mainly limpets. D. VIII. 13 or 14; A. 10 to 12.

One specimen from Robben Island, collected by Mr. Barrett-Hamilton, and 3 young specimens from Petropaulski, show the following characters: The depth of the occipital depression, the height of the different ridges and spines, and the amount of the irregularity in the cusps of the preopercular spine is subject to great individual variation. We find no important differences between this specimen and those from the Alaskan Peninsula reported on by Gilbert (Report Commissioner of Fish and Fisheries, 1896, 426). The occipital depression is less and the cross ridge behind it much lower in the adult from Robben Island, the occiput comparatively flat and without cross ridge in the young. We do not venture to base any distinctions on these differences which may be due in part to age and in part to individual variation. (*δίς*, two; *κεραός*, horned.)

Cottus diceraus, Pallas, Nov. Act. Petropol. 1783, 354, pl. 10, fig. 7, Petropaulski, Kamchatka (Coll. Steller); Cuvier & Valenciennes, Hist. Nat. Poiss., iv, 189, 1829; Günther, Cat., ii, 189.

Synauceia cervus, Tilesius, Mém. Ac. Pertersb., iii, 1811, 278, pl. 13, Petropaulski. (Coll. Steller.)

Cottus stelleri, Bloch & Schneider, Syst. Ichth., 63, 1801; after Steller.

Ceratocottus diceraus, Gill, Proc. Ac. Nat. Sci. Phila. 1859, 165, and 1861, 167.

Enophrys diceraus, Jordan & Gilbert, Synopsis, 711, 1883; Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 426.

729. COTTUS (Artedi) Linnæus.

(Miller's Thumbs.)

Cottus, Artedi, Genera Piscium, 49, 1738.

Cottus, Linnæus, Syst. Nat., x, 264, 1758 (*gobio* *).

Pegedictis, Rafinesque, Ichth. Ohiensis, 85, 1820 (*ictalops*).

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* *Cottus gobio*, the common Miller's Thumb of Europe, belongs to the same group as *Cottus pollicaris*, *philonips*, etc., having no palatine teeth, the skin smooth, and the ventral rays I, 4. The rays are D. VI to VIII, 16 or 17; A. 12. The name *Cottus* is restricted to this type by Cuvier & Valenciennes, who remark, "Ce genre (*Cottus*) avait pour type primitive, un petit acanthopterygien de nos rivières à tête large," etc.

Cottopsis, GIRARD, Proc. Bost. Soc. Nat. Hist., III, 1850, 303 (*asper*).
Potamocottus, GILL, Proc. Bost. Soc. Nat. Hist., VIII, 1861, 40 (*punctulatus*).
Tauridea, JORDAN & RICE, Man. Vert. E. U. S., Ed. 2, 255, 1878 (*ricei*).

Fresh water sculpins. Body fusiform. Head feebly armed; skin smooth or more or less velvety, its prickles, if present, not bony or scale-like; villiform teeth on jaws and vomer, and sometimes on palatines. Gill openings separated by a wide isthmus, over which the membranes do not form a fold; no slit behind fourth gill. Branchiostegals 6. Dorsals nearly or quite separate, the first of 6 to 9 slender spines; ventrals moderate, each with a short concealed spine and 4 soft rays. Lateral line present, usually more or less chain-like, sometimes incomplete. Preopercle with a simple spine at its angle which is usually curved upward, its base more or less covered by skin, very rarely obsolete; usually 2 or 3 spines turned downward below this; subopercle usually with a concave spine turned downward. Vertebræ 10 + 23 = 33; pyloric cæca about 4. Fishes of small size, inhabiting clear waters in the northern parts of Europe, Asia, and America. The species are extremely numerous, and are very difficult to distinguish, all being very similar in form, coloration, and habits. It is probable that these are descended from some Asiatic marine type, as *Trachidermus* (*Centridermichthys*) rather than from *Myoxocephalus*. In this case *Cottus asper* would approach more nearly to the ancestral form. From it are descended *Cottus semiscaber* and *Cottus ictalops*, with their multitude of variations. *Cottus gobio, aleuticus, philonips,* and *pollicaris* indicate the possible descent of *Uranidea*. In like manner *Triglopsis* seems to be descended through *Oncocottus* from *Myoxocephalus*. The Miller's Thumb, or Blob, is found in most streams and lakes where trout occur, and it is one of the most destructive enemies of the trout, devouring its eggs in great numbers. (*Cottus; κόττος*, an old name of the European Miller's Thumb, *Cottus gobio*, Linnæus, from *κόττα* head.)

a. Palatine bones each with a band of teeth (these rarely few in number or wholly absent).

PEGEDICTIS (πηγή, fountain; ἰχθύς, fish):

b. Preopercular spine short, hooked upward, partially or wholly concealed by skin; 2 or 3 smaller spines directed downward below it.

c. Anal rays 15 to 20; back and sides smooth or variously prickly.

d. Body robust; head rounded anteriorly.

e. Vent midway between base of caudal and tip of snout. ASPER, 2314.

ee. Vent nearer base of caudal than tip of snout. GULOSUS, 2315.

dd. Body long and slender; head narrowing rapidly forward, the snout acutely rounded. EVERMANNI, 2316.

cc. Anal rays 11 to 15.

f. Head narrowed anteriorly, the snout long; lateral line complete; back and sides coarsely prickly, sometimes smooth. RHOTHEUS, 2317.

ff. Head more or less blunt and rounded in outline anteriorly; the snout short.

g. Anal rays 13 to 15, usually 15; caudal peduncle stout; skin smooth. SHASTA, 2318.

- *gg.* Anal rays 11 to 13, usually 13.
  - *h.* Caudal peduncle very slender; its least depth not much greater than diameter of eye; body and head profusely speckled. PUNCTULATUS, 2319.
  - *hh.* Caudal peduncle deep, its least depth equal to length of snout; back and sides less distinctly speckled.
    - *i.* Head blunt, low, rounded anteriorly; body with vague dark clouds or specks, not very distinctly barred; skin smooth or variously prickly, sometimes very rough, sometimes perfectly smooth. SEMISCABER, 2320.
    - *ii.* Head less rounded, with a median depression; body usually with broad, oblique, dark bars; axil usually with some fine prickles, the back smooth. ICTALOPS, 2321.

TAURIDEA (ταύρα, cow; εἶδος, appearance):

- *bb.* Preopercular spine very large, as large as eye, and spirally hooked; back with stiffish prickles.
  - *j.* Dorsal VIII, 17; anal 12; head very broad and flat; body olivaceous, finely speckled and motled. RICEI, 2322.

COTTUS:

- *aa.* Palatine teeth wanting (rarely a few developed in males).
  - *k.* Preopercle with a spine at its angle, below which are 2 others directed downward.
    - *l.* Back and sides more or less prickly; dorsals connected; lateral line complete; preopercle with a long claw-like spine; dorsal VIII, 17; anal 13. ONYCHUS, 2323.
    - *ll.* Back and sides smooth or prickly behind axil only.
      - *m.* Preopercular spine long, curved upward in a spiral; dorsal fins low, connected; dorsals VII-19; anal 13. POLLICARIS, 2324.
      - *mm.* Preopercular spine curved upward; pectoral as long as head; dorsal VIII, 18; anal 14. COGNATUS, 2325.
      - *mmm.* Preopercular spine very short, hooked upward; dorsals well connected, the spines low, the soft rays high; lateral line incomplete. Lower preopercular spines well developed; D. VII, 21; A. 15. PERPLEXUS, 2326.
  - *kk.* Preopercle with a single short spine at its tip only, and no distinct spines below it, the lower spines reduced to angles of the bone.
    - *n.* Posterior nostrils in short, but conspicuous tubes;[*] dorsals connected; skin smooth or nearly so; dorsal VII to X, 18 or 19; anal 13 or 14.
      - *o.* Lateral line very incomplete. KLAMATHENSIS, 2327.
      - *oo.* Lateral line complete or nearly so.
        - *p.* Dorsal spines IX or X. ALEUTICUS, 2328.
        - *pp.* Dorsal spines VII. MINUTUS, 2329.
    - *nn.* Posterior nostrils without tubes; skin nearly smooth; D. VII or VIII, 16 to 18; anal 12 to 14.
      - *q.* Head moderate, 3½ to 4 in length.
        - *r.* Mouth rather large, the maxillary 2⅖ in head, reaching to opposite middle of eye.
          - *s.* Depth 4½ to 5 in length. BELDINGII, 2330.
          - *ss.* Depth 6 in length. PHILONIPS, 2331.
        - *rr.* Mouth very small, the maxillary 3⅔ in head, reaching front of pupil. ANNÆ, 2332.
      - *qq.* Head larger, 3¼ in length; depth 5; body much spotted. SPILOTUS, 2333.

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[*] Not described in *Cottus minutus*.

kkk. Preopercle without spine, its edge covered by smooth skin, a trace of the upper spine rarely present; skin smooth.
  t. Dorsals separate. LEIOPOMUS, 2334.
  tt. Dorsals connected, long and low, a shallow notch between spinous and soft parts. PRINCEPS, 2335.

Subgenus PEGEDICTIS, Rafinesque.

2314. COTTUS ASPER, Richardson.

(PRICKLY BULLHEAD.)

Head 3¼ to 3⅙; depth 4½. D. IX or X, 19 to 21; A. 17 or 18, rarely 15 or 16; eye 5 in head; maxillary 2½; pectoral 1⅓; ventral 2; caudal 1¾. Body deepest at shoulders; caudal peduncle moderately slender, its depth a little less than length of snout. Head wedge-shaped as viewed from above; mouth quite at lower profile of head; maxillary to below posterior margin of pupil; palatine teeth in a very narrow band on front of palatines only; preopercular spine long and sharp; interorbital rather wide, about equal to vertical diameter of eye; pectoral barely reaching front of anal; ventrals not reaching vent; dorsals slightly connected at base. Prickles coarse and stiff, not closely crowded; lateral line complete; vent in the middle of the body in the large majority of specimens, sometimes slightly nearly tail. Color grayish olive, much spotted and mottled with blackish; all fins, except anal and ventrals, with dark wavy cross lines. The coarser prickles, more anterior position of vent, and flatter interorbital space separate *Cottus asper*, at least subspecifically, from the Sacramento River form, *Cottus gulosus*. Streams of the Cascade Range from Vancouver Island to Oregon, abundant in cold streams; extremely variable, almost every variation in the roughness of the skin being found. Length a foot; the largest species of *Cottus*. Here described from a specimen from Walla Walla.

Dr. Gilbert notes:

Five specimens taken in a small stream emptying into Departure Bay, Vancouver Island. The head is naked in all of these, and the prickles absent on belly, along bases of spinous dorsal and anal fin, and on caudal peduncle. D. VIII or IX, 21 or 22; A. 16 to 18.

Still other specimens from Vancouver Island and about Port Townsend have a band of small prickles extending along lateral line to middle of second dorsal. (*asper*, rough.)

Cottus asper, RICHARDSON, Fauna Bor.-Amer., Fish., 295, 1836, Columbia River at Fort Vancouver. (Coll. Dr. Gairdner.)

Trachidermis richardsoni, HECKEL, Ann. Wiener Mus. 1840, 162, Columbia River; after RICHARDSON.

Centridermichthys asper, RICHARDSON, Voyage Sulphur, Ichth., 74, 1845; GÜNTHER, Cat., II, 170.

Cottopsis asper, GIRARD, U. S. Pac. R. R. Surv., X, Fish., 51, 1858.

Uranidea aspera, JORDAN & GILBERT, Synopsis, 694, 1883.

2315. COTTUS GULOSUS (Girard).

Head 3; depth 4½; D. VIII or IX, 19 to 21; A. 16 to 18; eye 5 to 6 in head; maxillary 2½; pectoral 1⅛; caudal 1⅘. Body not much compressed, the caudal peduncle about as wide as length of snout, head broadly rounded at snout as viewed from above; mouth large, the maxillary reaching to the posterior margin of pupil; bands of palatine teeth variable in specimens from different localities, varying from a moderate band to a wide one; interorbital equal to width of eye; preopercular spine rather sharp and long. Pectorals reaching to front of anal; ventrals not reaching to vent; dorsals slightly connected at base. Skin prickly or more or less smooth, the prickles, when developed, small, crowded, and flexible. Vent nearer base of caudal than tip of snout. Color grayish olive, mottled with darker; ventrals light, anal light or slightly dusky; other fins crossed with wavy lines of light and dark. Streams of the Coast Range in California south to Point Concepcion, very common; the back and sides usually closely prickly (*parvus*), but the skin often wholly or partly smooth (*gulosus*), the smooth specimens usually with axillary prickles; the prickly form more common coastwise, the other perhaps more abundant in streams of the interior, the two not distinguishable by any permanent character. Here described from specimens from San Francisquito Creek, Santa Clara County, California, 3 to 7 inches in length. (*gulosus*, big-mouthed.)

Cottopsis gulosus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 129, San Mateo Creek [*] (Coll. R. D. Cutts. Type, No. 290, U. S. Nat. Mus.); San Joaquin River (Coll. Dr. Heermann, No. 291, specimens prickly in axils only); GIRARD, U. S. Pac. R. R. Surv., x, Fish., 53, 1858.

Cottopsis parvus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 54, Monterey, Presidio, Fort Reading, Petaluma; prickly specimens.

Cottus semiscabra centropleura, EIGENMANN & EIGENMANN, West Amer. Scientist, Vol. VI, No. 49, November, 1889, 149, Allen Springs, Lake Co., Cal. (Coll. D. Cleveland); specimens with sides prickly.

Centridermichthys gulosus, GÜNTHER, Cat., II, 170.

Uranidea gulosa, JORDAN & GILBERT, Synopsis, 695, 1883.

2316. COTTUS EVERMANNI, Gilbert.

Head 3⅖ in length; depth 5; depth of caudal peduncle 2¾ in greatest depth. D. VII, 21; A. 18; P. 16; V. I, 4. Head small, depressed, narrowing rapidly forward, the snout more acutely rounded than in *C. punctulatus*. Mouth with distinct lateral cleft, the maxillary reaching a vertical immediately in advance of pupil, 2⅘ in head. Mandible slightly protruding. Teeth in narrow bands on jaws, vomer, and palatines, the latter very weak, apparently concealed in part beneath the skin. Total interorbital width about ⅔ diameter of eye, shallowly concave; occipital area flat or gently convex. Eye small, 1⅙ in snout, 5 in head. Pores on head unusually large, the most conspicuous occurring on suborbital ring, along mandible and preopercle, and in a horizontal line above opercle; 3 pores form a straight transverse line behind the orbit; a short nasal tube; upper preopercular spine represented by a short triangular process, the margin of the bone below it being smoothly rounded. Spinous dorsal short and comparatively very high, the longest spine slightly more than

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[*] The young individual from Upper Pitt River (Coll. Dr. J. S. Newberry), mentioned by Dr. Girard, probably belongs to *Cottus shasta*.

$\frac{3}{4}$ the longest soft ray; last spine higher than the first and about $\frac{4}{5}$ the longest, the least height of the membrane joining last spine to first soft ray exceeding length of snout; longest ray of soft dorsal slightly more than $\frac{1}{2}$ head; all the rays of dorsal and anal fins simple, unbranched; caudal long and narrow, nearly truncate when spread, $\frac{6}{7}$ length of head; 9 caudal rays are branched at tip for about $\frac{1}{5}$ length of rays. The pectoral reaches the vertical from fourth ray of soft dorsal, the upper ray simple, the next 6 or 7 forked, the remaining rays being thickened with incised membranes; ventrals with 1 spine and 4 rays, not reaching vent, $1\frac{3}{4}$ in head. Lateral line conspicuous anteriorly, running high, interrupted under eleventh or twelfth ray of soft dorsal, a mere trace visible thence to base of caudal. Sides of body thickly covered with coarse prickles, the head, the breast, belly, and a narrow strip along base of anal fin naked. Color light brownish, faintly vermiculated with darker, with traces of 5 irregular cross bars from back, and a narrow distinct bar at base of caudal; pectorals, dorsal, and caudal cross-barred. Characterized by the long slender body entirely covered with coarse prickles, the short spinous dorsal very broadly united to the very long soft dorsal, the long anal fin, the incomplete lateral line, the very large pores on head, the branched pectoral rays, and the absence of any distinctly projecting preopercular spine. One specimen, $2\frac{1}{2}$ inches long, from Lost River, near Klamath Falls, Oregon. (Named for Barton Warren Evermann.)

Cottus evermanni, GILBERT, Bull. U. S. Fish Comm. 1897, 11, with figure, Lost River, Lostine, Oregon. (Type, No. 48228. Coll. Gilbert, Cramer, and Otaki.)

2317. COTTUS RHOTHEUS, Rosa Smith.

Head $2\frac{5}{6}$; depth $4\frac{1}{2}$. D. VII or VIII-16 or 17; A. 11 or 12; lateral line 32 to 34; eye $5\frac{1}{2}$ in head; maxillary $2\frac{1}{3}$; pectoral $1\frac{1}{2}$; caudal $1\frac{5}{9}$. Body rather deep at shoulders, tapering into a slender caudal peduncle; head pointed, somewhat wedge-shaped; mouth large, horizontal, at lower profile of head; maxillary reaching to posterior margin of pupil; palatine band of teeth very broad and long; interorbital concave, about as wide as eye, preopercle spine sharp, with 2 smaller ones below it. Pectorals reaching to front of anal; ventrals not reaching vent; dorsals scarcely connected; lateral line complete. Skin of head smooth, that of back and sides usually rough, with short coarse prickles, shorter and stiffer than in *Cottus asper*. Color dark gray, spotted and mottled with blackish; all fins, except ventrals, mottled with blackish; belly white in the smaller specimens, dusky, with small black points, in the larger ones. Columbia River Basin, generally common; a well marked species. Here described from specimens from Hangman Creek, Tekoa, Washington, from 3 to 4 inches in length.

Concerning this species Gilbert & Evermann remark: "This strongly marked species is abundant in the Spokane region, and was taken at the following stations: Little Spokane River at Dart's Mill near Spokane, and at Chattaroy, Washington; Columbia River at Colville, Washington; Cœur d'Alene Lake near Cœur d'Alene, Idaho; Clearwater River near

Lewiston, Idaho; Walla Walla River at Wallula, Oregon; Hangman Creek at Tekoa, Washington; Natchess River at North Yakima, Washington; Newaukum River near Chehalis, Washington; Snoqualmie River at Snoqualmie Falls, Washington."

The salient features of this species are: (1) the pointed, wedge-shaped profile of head, as viewed from above, this contrasting strongly with the usually broadly rounded contour of other species; (2) the wide horizontal mouth, quite at lower profile of head; (3) the noticeably concave interorbital and occipital regions; (4) the very broad and long palatine band of teeth; (5) the rather slender body and the extremely slender caudal peduncle, the latter expanding fan-like at base of caudal fin; (6) the dorsals usually separate; when united, at extreme base only; (7) lateral line complete; (8) sides usually well invested with prickles, which are triangular and coarse, and less closely placed than in *asper*. They are arranged more or less definitely in oblique series. There is considerable variation in the completeness of the investment, and in one specimen from Chehalis an axillary patch only is present.

The specimens from Chattaroy and from Snoqualmie Falls are referred to this species with doubt as to their identity. The following table will give an idea of the amount of variation in number of fin rays found in this species:

Locality.	Spinous D.		Soft D.		Anal.			Pectoral.		Lateral line.
	VII.	VIII.	16	17	11	12	13	15	16	
Little Spokane River	4	6	6	4	3	6	1	....	10	32 to 34
Natchess River	......	2	2	....	....	1	1	....	2	32 to 33
Newaukum River	......	2	1	1	1	....	1	2	......	....
Walla Walla River	1	2	1	2	1	2	....	....	3	....
Colville River	......	1	1	....	....	1	....	1	......	....
Tekoa	1	5	5	1	1	4	1	....	......	....
Cœur d'Alene	1	4	3	2	3	2	....	....	5	....
Lewiston	......	1	1	....	....	1	....	....	1	....

(*ῥόθος, ῥοθιάς*, rushing of the torrent.)

Cottus rhotheus, ROSA SMITH (MRS. EIGENMANN), Proc. U. S. Nat. Mus. 1882, 347, Spokane Falls, Washington. (Type, No. 30737.)
Uranidea rhothea, JORDAN & GILBERT, Synopsis, 953, 1883.

2318. COTTUS SHASTA, Jordan & Starks.

Head 3 to $3\frac{1}{3}$; depth $4\frac{1}{2}$. D. VIII or IX, 17 or 18; A. 13 to 15; eye nearly 5 in head; maxillary $2\frac{1}{5}$; third or fourth dorsal spine $3\frac{3}{5}$; highest soft ray about 2; pectoral $1\frac{1}{10}$; caudal $1\frac{1}{4}$. Body not much compressed; caudal peduncle rather wide, about equal to snout; mouth rather large, the maxillary reaching to posterior margin of pupil; teeth in a moderate band on jaws and vomer, in an exceedingly narrow band on front of palatines; interorbital space not much over $\frac{1}{2}$ eye; upper preopercular spine short, not much hooked up and not very sharp, a shallow concave space between it and the second, scarcely a notch; the second small and sharp, the third but slightly developed; pectoral reaching to below the fourth ray of soft dorsal; ventral not reaching the vent; dorsals scarcely connected, the soft dorsal high, the highest rays equal to eye and snout; vent slightly nearer tail than tip of snout. Skin smooth, except a few scattered prickles under pectorals. Color very dark brown or blackish; sides mottled; top of head uniform blackish; all the fins more or less mottled, ventrals white or dusky. The following is the fin formula of 4 specimens: Dorsal, IX, 17; VIII, 18; IX, 17; IX, 18. Anal, 14; 15; 15; 13. Upper Sacramento Basin about Mount Shasta. Here described from 4 specimens from McCloud River, at Baird, Shasta County, California, about 4 inches in length. The species is very close to *Cottus semiscaber*, but it has a longer anal, which in turn is shorter than in *Cottus gulosus*. (Named for Mount Shasta.)

Cottus shasta, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1896, 224, McCloud River, at Baird, California. (Coll. E. C. Starks. Type, No. 4196, L. S. Jr. Univ. Mus.)

2319. COTTUS PUNCTULATUS (Gill).

Head 3; depth 4¾. D. VII or VIII, 17 or 18; A. 11 or 12; eye 6 in head; maxillary 1⅔; third dorsal spine 3; highest ray of soft dorsal 2½; highest anal ray 2¼; pectoral 1¼; ventral 1¾; caudal 1¾. Body tapering into a slender caudal peduncle which is not much wider than eye; teeth in wide bands on jaws, vomers, and palatines; interorbital space rather wide, about equal to eye; maxillary reaching to posterior margin of eye; preopercular spine rather sharp; vent slightly nearer tail than tip of snout. Pectoral reaching to below base of fourth ray of soft dorsal; ventrals not reaching vent; dorsals scarcely connected, the soft dorsal extending farther back than anal; skin in these specimens entirely smooth. Color olivaceous, everywhere punctulate with black spots, more conspicuous on top of head; tip of snout and lower jaw dark, dusky with dark points under lower jaw; dorsals, pectorals, and caudal with wavy streaks and series of spots; anal and ventrals white, anal sometimes dusky; 4 or 5 dark blotches on back indicating cross bars; a dark bar at base of caudal. Length 4 or 5 inches. Headwaters of Green River, Wyoming. Here described from many specimens from Green River, Wyoming, collected by Evermann & Rutter. This species will prove to be a local or desert variation of the widely distributed *Cottus semiscaber*, from which it differs only in the slender caudal peduncle and the speckled coloration. The name *punctulatus* has priority over *semiscaber*, if the forms are to be united, but in this case it would hardly be worth while to separate either from *Cottus ictalops*.

Gilbert & Evermann refer to the specimens here described as—

Numerous specimens from Green River, Wyoming. Comparing these with typical *semiscaber* from the vicinity of Pocatello, Idaho, we can appreciate no difference whatever, except in the matter of armature. None of our Green River specimens shows any prickles whatever. About half the Pocatello specimens are also naked and are indistinguishable from typical *punctulatus;* in the others more or less prickles are developed, varying from a few in axil of pectorals to a band covering more than ½ of the sides. As this is not an unusual amount of variation, we do not consider *Cottus semiscaber* worthy of recognition. The relations of *Cottus punctulatus* with the eastern species have not been carefully worked out, and it seems best to recognize it for the present as distinct. Specimens from Green River, Wyoming, and from Mink Creek, Ross Fork, and Port Neuf River, Pocatello, Idaho. The collection contains also 2 specimens from Thompson Falls and 3 from Flathead Lake, which seem to be this species. By the Fort Hall Indians this fish is called *ahwe*, a word meaning horns.

(*punctulatus*, speckled.)

Potamocottus punctulatus, Gill, Proc. Bos. Soc. Nat. Hist. 1861, 40, Bridgers Pass, Wyoming (Coll. Capt. Simpson); Gill, Ichth. Capt. Simpson Expl., 402, 1876, with plate.
Cottus punctulatus, Gilbert & Evermann, Bull. U. S. Fish Comm. 1894, 202.
Uranidea punctulata, Jordan & Gilbert, Synopsis, 697, 1883.

2320. COTTUS SEMISCABER (Cope).

(Rocky Mountain Bullhead.)

Head 3; depth 4½; D. VIII–17 or 18; A. 12 or 13; eye 5 in head; maxillary 2¼; third dorsal spine 4 in head; highest dorsal rays 2⅘; pectoral 1¼; ventral nearly 2; caudal 1⅗. Body not much compressed, caudal peduncle wide, equal to length of snout; head broad and rounded anteriorly as viewed from above; mouth large, the maxillary reaching about to posterior margin of eye; band of teeth broad on jaws, vomer, and the palatines; interorbital space (bone only) narrow, not over ½ eye; preopercular spines rather stout and blunt. Pectorals reaching to front of anal; dorsals not connected, scarcely meeting in some specimens; ventrals not reaching to vent; last rays of soft dorsal reaching almost to base of caudal, highest dorsal rays equal snout and ½ eye; vent much nearer tail than tip of snout. Color slaty gray in spirits, with mottlings on sides which form inconspicuous cross bars; pectorals, dorsals, and caudal, with wavy cross lines; ventrals and anal white or sometimes dusky and mottled; a dark spot on spinous dorsal posteriorly, fin edged with white. Rocky Mountain region, in clear streams on both slopes. Abundant in Colorado, northern New Mexico, Wyoming, Montana, Idaho, Utah, eastern Washington, and Oregon. Found in the upper basins of the Fraser, Columbia, Missouri, Colorado, Platte, Arkansas, and Lake Bonneville, its eastern and northern limits not well ascertained. It is subject to very great variations in color, size, and roughness of skin. Most specimens are smooth, or rough only in the axil. Some, especially from southern Idaho and Provo River, Utah, are quite rough, some of them as rough as *Cottus asper* or *Cottus rhotheus*. These rough specimens differ in no other respect from smooth ones from the same localities. The specimens here especially described are from Eagle River at Gypsum, Colorado, the largest 4½ inches in length.

Rough specimens from Provo are thus described by Jordan & Gilbert (Synopsis, 695): Head 3⅓; depth 4½. D. VII, 18; A. 14; V. I, 4; eye 4½ in head. Form of *Cottus asper*, but slender. Skin of top of head and entire body, except lower part of caudal peduncle, thickly covered with slender papillæ; those of anterior and upper parts of body each tipped with a spine, many of those on head with median pores; top of head with a median lengthwise depression. Head narrowed anteriorly, the maxillary extending to beyond pupil; opercular and preopercular spines as in *Cottus asper*; lateral line not complete; spinous dorsal low; soft dorsal and anal high; caudal long; pectorals about reaching anal; ventrals rather broad, reaching about halfway to anal. Olivaceous, barred and spotted as in other species; fins mottled; spinous dorsal pale at base and tip, with a median broad black band; 2 dark blotches at base of caudal. Length 4 inches. The specimens here described from Provo River at Provo, where it is associated with the smooth form called *wheeleri*, which differs only in its smooth skin. In specimens from the Yellowstone Park the band of palatine teeth is very broad; there are no prickles on the skin. The head is 3½ in length and the rays are D. VII, 17; A. 13; V. I, 4. Comparing these (Gibbon River, Wyoming) with specimens of *Cottus ictalops*, from Mammoth Spring, Arkansas, the differences seem well marked. *Cottus semiscaber* has the head blunter, lower, and more rounded, the cheeks more tumid and the top of the head without median longitudinal depression. *Cottus ictalops* has the axil prickly, the outline of the head angular, the top of the head with a median longitudinal depression from snout to nape, and the body has broad distinct black cross bars. These 2 forms seem like distinct species, but other specimens are intermediate; specimens from Torch Lake, Michigan, agree with *semiscaber* in color, and are intermediate in form; specimens from White River, Indiana, are colored like *ictalops*, but are intermediate in form. Apparently *semiscaber* should be recognized as a species, but its range and distinctive characters are yet to be made out in detail. (*semiscaber*, half rough.)

Cottopsis semiscaber,* Cope, Hayden Survey of Montana, 476, 1871 (1872), Fort Hall, Idaho; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1880, 459; Jordan, Bull. U. S. Fish Comm. 1889, 53.

Uranidea semiscabra, Jordan & Gilbert, Synopsis, 695, 1883.

Uranidea vheeleri, Cope, Proc. Amer. Phil. Soc. Phila. 1874, 138, Bear River, Utah. (Coll. Lieut. G. M. Wheeler.)

Uranidea vheeleri, Cope & Yarrow, Zool. Wheeler's Expl. W. 100th mer., v, 696, pl. 32, figs, 3, 3a, 3b, 1876; Jordan & Gilbert, Synopsis, 697.

Cottus bairdi punctulatus, Jordan, Bull. U. S. Fish Comm. 1889, 29, 36, 53; with plate.

2321. COTTUS ICTALOPS (Rafinesque).

(Miller's Thumb; Blob; Muffle-jaw; Bullhead; Springfish.)

Head 3⅓; depth 4 to 6. D. VI to VIII, 16 or 17; A. about 12; V. I, 4. Body slender or stout, tapering regularly backward to the tail; vertex somewhat depressed; interocular space with a groove; preopercle with a short, sharp spine, little hooked, directed backward and upward, mostly covered by the skin; below this are 2 smaller concealed spines; subopercle with a stoutish spine, directed forward. Skin smooth, except the region immediately behind the pectorals, which is beset with very small, sharp prickles, which are sometimes obsolete; lateral line conspicuous, continuous, or interrupted behind; first dorsal low and feeble; pectoral fins large, their length nearly equal to that of the head, their tips usually reaching beyond the origin of the soft dorsal; ventral fins moderate; isthmus very broad, the gill membranes not forming a fold across it. Olivaceous, more or less barred and speckled with darker; fins mostly barred or mottled. Length 3 to 7 inches. Middle and Northern States, abounding in all clear, rocky brooks and lakes east of the Dakotas and Kansas to New York and Virginia, extending southward along the Alleghanies to North Carolina and northern Alabama, especially abundant in limestone springs and entering caves. Extremely variable; very destructive to eggs of trout. (*Ictalurus*, the catfish; *ὤψ* eye; "the name means cat's eye; eyes like those of the catfishes with oblong eyes." Rafinesque.)

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* *Cottopsis semiscaber* is thus described by Professor Cope:

"Radii, D. VII, 18; A. 13; V. I, 4; first ray of anal below third of second dorsal. Skin prickly above the lateral line, smooth below it posteriorly. Body compressed, profile rising rather steeply to the basis of first dorsal fin. Eye 4.5 times in head, .75 time in interorbital space. Muzzle contracted, maxillary bone reaching to below middle of pupil. Two spines on preoperculum; 1 on inferior angle of operculum. Lateral line discontinued on last fourth of caudal peduncle. Head ⅓ length, without caudal fin. Below yellow; dorsal line with a series of dark spots; sides with large dark clouds. Three specimens from Fort Hall, Idaho." (Cope.)

NOTE.—As here understood, *Cottus ictalops* is a widespread and abundant species, varying in different regions, as is the case with most nonmigratory species. In this, as in others of similar range, the inhabitants of each stream may show local peculiarities. A number of these forms have received from Dr. Girard specific names, which are accompanied by detailed descriptions. Large collections of these fishes show that numerous similar "species" still exist undescribed, as it is a rare thing to find a specimen which exactly agrees in all respects with any of the species in Dr. Girard's "Monograph of the Fresh-Water Cottoids." In this work the figures and long descriptions give characters of individuals, not of species.

Pegedictis ictalops,* RAFINESQUE, Ichth. Ohiensis, 85, 1820, spring near Lexington, Kentucky.

Cottus richardsoni,† AGASSIZ, Lake Superior, 300, 1850, north shore of Lake Superior (Coll. Louis Agassiz and Dr. C. T. Jackson); GIRARD, Monograph Fresh-Water Cottoids N. A., 39; GÜNTHER, Cat., II, 158; not *Trachidermis richardsoni*, HECKEL.

Cottus bairdii,‡ GIRARD, Proc. Amer. Assoc. Adv. Sci., II, 1850, 410, and Monograph Cottoids, 44, with plate, Mahoning River, Poland, Ohio. (Coll. S. F. Baird.)

Cottus meridionalis,§ GIRARD, Proc. Amer. Assoc. Adv. Sci., II, 1850, 410, and GIRARD, Monograph Cottoids, 47, James River, Virginia. (Coll. S. F. Baird.)

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* In spite of the errors in description, there can be no doubt that Rafinesque's "cat's eye Springfish," *Pegedictis ictalops*, is the present species; the dorsal rays are counted wrongly, and the scales are said to be small. Nevertheless, "in the distorted perspective of his mental vision" Rafinesque could have had nothing else. In other words, his description was drawn up hastily and in part from memory.

† The form called *Cottus richardsoni*, Agassiz, is rather slender, with the vent rather more posterior than usual, placed midway between the snout and the tip of the caudal; in the others it is nearly midway between the snout and the middle of the caudal. Lake Superior. A specimen taken by Dr. Jordan in Lake Superior at Marquette, Michigan, agrees with *Cottus ictalops* from southern Missouri. It is a little more slender, the color a little darker and less definite, the cross bars fainter, the dark punctulations more conspicuous. The vent has the usual position, although Dr. Girard figures the vent in his Lake Superior specimens, types of *Cottus richardsoni*, as farther back than in *Cottus ictalops*. In his figure of *Cottus richardsoni* the vent is a shade nearer base of caudal than posterior margin of eye. In all specimens we have seen it is nearly midway between nostril and caudal. D. VIII, 18; A. 12, in the specimen from Marquette.

‡ The form called *Cottus bairdi*, Girard, is small and slender, with the spinous dorsal very low, and the palatine teeth less developed than in the other forms. Cayuga Lake, New York, to Ohio.

§ *Cottus meridionalis*, Girard, is rather robust, with the dorsal fins scarcely connected, and the mouth larger, the maxillary extending to opposite posterior border of eye; the preopercular spine is sharp and directed well upward. Pennsylvania to North Carolina, along the Alleghanies; abundant.

Cottus wilsoni,[*] GIRARD, Monograph Cottoids, 42, 1851, Pittsburg, Pennsylvania. (Coll. Jacob Green.)

Cottus alvordii,[†] GIRARD, Monograph Cottoids, 46, 1851, Fort Gratiot, Lake Huron. (Coll. Major Benj. Alvord.)

Potamocottus zopherus,[‡] JORDAN, Ann. Lyc. Nat. Hist. N. Y. 1876, 320, Etowah River and tributaries, Rome, Georgia. (Coll. Jordan & Gilbert.)

Uranidea richardsoni. JORDAN & GILBERT, Synopsis, 696, 1883.

Uranidea richardsoni, JORDAN & GILBERT, Synopsis, 696, 1883; but the name *richardsoni* is preoccupied in *Cottus*.

Cottus bairdii, JORDAN, Bull. U. S. Fish Comm. 1889, 29.

Potamocottus carolinæ,[§] GILL, Proc. Bost. Soc. Nat. Hist. 1861, 40, Carolina; GILL, in Simpson Rept. Ichth. Utah, 403, 1877.

Subgenus TAURIDEA, Jordan & Rice.

2322. COTTUS RICEI, Nelson.

Head 3⅗; depth 5⅓. First dorsal VIII, second dorsal and anal destroyed; V, I, 4; P. 15. Eye 4¼, 1½ in interorbital space and equalling snout. Body short and stout, abruptly contracted opposite base of anal. Head much depressed, very broad and flat, broader than body, breadth greater than length; depth ½ length. Palatine teeth present. Tail very small, subterete. Outline tadpole-like. Jaws about equal; mouth rather narrow; jaws contracted and somewhat produced. Eyes on upper surface near together. Preopercular spine extremly large, 3 times as large as in any other fresh-water Cottoid known, as long as eye, hooked backward and upward, giving a buffalo-like appearance. Three spines hooked downward below the larger spine; the lower concealed; a strong spine hooked forward at base of opercles. Branchiostegals 6. Isthmus as wide as from snout to middle of orbit. Base of pectorals crescentic, their tips just short of anal; rays all simple; ventrals reaching ⅔ distance to vent. Profile rising rapidly to dorsal, which runs along a sort of carina. Dorsal beginning a trifle behind ventrals, just behind head, about midway between snout and anal. Vent midway between snout and base of caudal. Depth at first ray of anal less than ½ length of head, thickening at same point over ⅓. Head smooth. Space above lateral line behind head covered with small stiff prickles hooked backward, readily visible as small black specks when skin is dry. Color pale brown, irregularly spotted and mottled with darker brown somewhat as in *Lota;* pectorals mottled; belly white; spines spirally curved, forming ½ a spiral. The most peculiar characters are the strong spines of the preopercle and the smaller ones below, the carinated back and abruptly contracted body, forming the subterete caudal peduncle. The prickles of the skin are coarser than in any other species. (Nelson.) Length of type 2⅚ inches. Great Lakes, the 2 type specimens from Lake Michigan, near Evanston, Illinois, in rather deep water; remains of others occur among Girard's types of *Triglopsis thompsoni* from Lake Ontario. The group *Tauridea*, of which this species is type, may be worthy of generic rank. (Named for its discoverer, Mr. F. L. Rice, then a student in zoology in Northwestern University at Evanston.)

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[*] *Cottus wilsoni*, Girard, is rather stouter, with stronger palatine teeth, and with some of the uppermost of the pectoral rays bifurcate, these being entire in the others. Ohio Valley, Pennsylvania, and Indiana.

[†] *Cottus alvordi*, Girard, is short and chubby, with the first dorsal rather high, and joined by membrane to second more than in the other forms. Common in Wisconsin and Michigan.

[‡] *Cottus zopherus*, Jordan, is slender and very dark in color, and more conspicuously variegated; the first dorsal high; the palatine teeth well developed; probably worthy of varietal recognition. Alabama Basin.

[§] *Cottus carolinæ*, Gill, is a very large form, rather robust, reaching a length of nearly 6 inches, without axillary prickles, and with the palatine teeth well developed. The lateral line, as in the other forms, is sometimes continuous and sometimes interrupted. It abounds in the limestone region from Indiana to Tennessee, and is frequently found in caves.

Cottus ricei, NELSON, Bull. Ills, Mus. Nat. Hist., Vol. I, No. 1, 40, 1876, Lake Michigan, at Evanston (Coll. F. L. Rice).
Uranidea spilota, JORDAN & GILBERT, Synopsis, 694; not of COPE.
Uranidea ricei, JORDAN & GILBERT, Synopsis, 953.

Subgenus COTTUS.

2323. **COTTUS ONYCHUS**, Eigenmann & Eigenmann.

Head 3¾; depth 5½. D. VIII, 17; A. 13; V. I, 4; P. 13; eye 1⅓ in snout, ½ in interorbital, 5 in head. Teeth on vomer, none on palatines. Width of head equaling its length to end of preopercular spine, its depth 2 in length. Preopercle with an upturned claw-like spine, below which are 2 others, much smaller, the anterior one having its point turned downward and forward. Maxillary not reaching orbit; lateral line complete. Sides above lateral line, with stiff prickles from below first spine to below last dorsal ray; prickles below lateral line confined to the abdominal part of the sides. Dorsal connected by a low membrane, the rays much higher than the spines, 3½ in head. Pectoral reaching past vent, its rays not branched. A dusky spot on breast just behind anterior end of gill slits; ventral surface including the ventrals otherwise plain; anal with a few dusky specks on its rays; other fins barred; sides and upper surfaces olive with darker spots; 3 dark bands below soft dorsal; a dark band just in front of caudal. Length about 3½ inches. Saskatchawan Basin. This species is evidently closely related to *Cottus pollicaris*, from which it differs chiefly in having many prickles. (Eigenmann.) Not seen by us and perhaps not different from *Cottus pollicaris*. (ὀνυχός, clawed.)

Cottus onychus, EIGENMANN & EIGENMANN, Am. Nat., Nov., 1892, 963, Bow River, at Calgary, a tributary of the South Saskatchawan, Alberta Territory. (Coll. C. H. Eigenmann.)

2324. **COTTUS POLLICARIS** (Jordan & Gilbert).

Head 3⅗ in length to base of caudal; depth 4¾; eye 5⅓ in head. D. VII, 19; A. 13; V. I, 4; P. 17. Lateral line complete. Body robust; nape prominent, the profile of head steeply declined, thence to tip of snout in a straight or slightly concave line; head much depressed, broad and flat above, evenly narrowed forward to the broad, much depressed, bluntly rounded snout; eyes small, with extensive vertical range, their diameter less than snout or the flat interorbital width; mouth rather small, anterior, with but little lateral cleft, maxillary reaching vertical from front of orbit; teeth villiform on jaws and vomer, none on palatines; preopercular spine large and strong, spirally curved upward and inward, wholly invested with membrane; a single sharp concealed spinous point below angle of preopercle; isthmus broad, without fold, its width equaling distance from snout to middle of pupil. Spinous dorsal rather low, nearly uniform in height, connected with second dorsal by a low membrane; longest spine equaling length of snout; soft dorsal long, its longest ray 2⅕ in head; origin of anal fin under third dorsal ray, its last ray under sixteenth of dorsal; highest anal ray 2½ in head; ventrals I, 4, reaching ⅔ distance to vent; pectoral rays all simple, unbranched, the longest reaching vertical from vent, and contained 1⅛ times in head. Vent equidistant between tip of snout and base of caudal fin. Skin everywhere smooth. Color olivaceous above, little punctulated, lower ⅖ of sides and whole under side of head and body uniform whitish above, head and body with irregular spots and blotches of black; these in finer pattern on head, and not forming bands on back; dorsals, caudal, and pectorals with black spots arranged in more or less distinct series; anal, ventrals, and lower rays of pectorals translucent, unmarked. Lake Michigan; a single specimen 4½ inches in length taken off Racine, Wisconsin, by Dr. Philo R. Hoy. (*pollex,* the thumb, suggested by the name, Miller's Thumb.)

Uranidea pollicaris, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 222, Lake Michigan, off Racine, Wisconsin (Type, No. 29663. Coll. P. R. Hoy); JORDAN & GILBERT, Synopsis, 954, 1883.

2325. COTTUS COGNATUS, Richardson.

(BEAR LAKE BULLHEAD.)

This species is thus described by Richardson: The *Cottus* which forms the subject of this article was taken in considerable numbers in the clear waters of Great Bear Lake during the month of May, at which period it resorts to the stony shallows to spawn. Specimens which we sent to Baron Cuvier were returned with the remark that they belonged to a species of *Cottus* and were "très semblables aux *C. gobio*," and they, indeed, correspond in most particulars with the extended description of the latter in the Histoire des Poissons. I have since compared these specimens minutely with an English *gobio*, kindly lent to me by Mr. Yarrell, and the principal difference that I have been able to detect in the American fish is the greater height of its dorsal and anal fins. There is also a discrepancy in the number of rays, but this can scarcely be accounted a specific distinction, since different individuals of *gobio* show equally extensive variations. The Bear Lake specimens having been long in spirits have lost much of their color, but the following particulars may still be noted: In *Cottus gobio* the rays of the pectorals are variegated with rings alternately dark and light; in *cognatus* the color is almost uniform, but varies in intensity in different individuals. In 1 small female specimen of the latter, however, there is a slight indication of these rings, and its body likewise is marbled in a more lively manner than the rest, having a greater resemblance to *gobio*. The males are darker than the females in the American as well as the European species. The specimen which we have described in detail was the largest we obtained, and was selected for description from its being exactly in the same length with the *gobio* with which it was compared. Great Bear Lake. Length 4 inches. (Richardson.) Not seen by recent naturalists, probably allied to *Cottus pollicaris*. (*cognatus*, related, to *Cottus gobio*.)

Cottus cognatus, RICHARDSON, Fauna Bor.-Amer., III, 40, 1836, Great Bear Lake (Coll. J. Richardson); GIRARD, Mon. Cot., 41; GÜNTHER, Cat., II, 157.
Uranidea cognata, JORDAN & GILBERT, Synopsis, 953, 1883.

2326. COTTUS PERPLEXUS, Gilbert & Evermann.

Head $3\frac{1}{5}$; depth $4\frac{1}{5}$. D. VII, 21; A. 15; P. 16; V. I, 4; eye 4; snout 4; interorbital width $5\frac{1}{2}$. Least depth of caudal peduncle greater than snout, $3\frac{2}{3}$ in head; interorbital space rather broad, about $1\frac{1}{2}$ in eye. Body deeper and more compressed than in any other species known to us, this being especially noticeable posteriorly; caudal peduncle very short and deep, and entirely overlapped by posterior dorsal rays which extend beyond base of caudal fin. Length of caudal peduncle from base of last dorsal ray about $\frac{3}{4}$ depth of same; depth of body at origin of anal fin $\frac{2}{3}$ length of head. Interorbital space slightly concave; occiput flat or transversely convex. Mouth oblique, the maxillary reaching vertical from posterior margin of pupil, $2\frac{1}{2}$ in head. Teeth in a very narrow crescentic band on vomer, none on palatines. Upper preopercular spine short and broad, curved or simply directed upward; below this are 2 stout, blunt spines directed downward. Body entirely naked, lateral line incomplete, not reaching end of soft dorsal. Spinous dorsal low, the longest spines not greater than length of snout; soft fins all high, the fifteenth dorsal ray equaling snout and eye; a broad membrane always connecting the 2 dorsals, the notch inconspicuous; last rays of anal, as well as dorsal, extending beyond base of caudal; first anal ray under third ray of soft dorsal; ventral spine and rays slender and weak. Anus midway between base of caudal fin and front of eye. Color in alcohol, back and sides with vermiculations of light and dark, the back with 5 or 6 ill-defined black cross bars, which usually reach the lateral line; the usual black bar at base of caudal, emarginate posteriorly; below the lateral line a number of small, quadrate dark blotches, arranged in 2 irregular series; lower part unmarked, except with fine dark punctulations; dorsal, pectoral, and caudal fins cross-barred with dark; anal and ventrals with numerous small dark specks. Length about $3\frac{2}{3}$ inches. Shookumchuck and Newaukum rivers, near Chehalis, in western Washington. (Gilbert & Evermann.) (*perplexus*, perplexed.)

Cottus perplexus, GILBERT & EVERMANN, Bull. U, S. Fish Comm. 1894, 202, pl. 20. (Type, No. 45387, U. S. Nat. Mus.; Cotypes, Nos. 1324 to 1343, L. S. Jr. Univ. Mus.); Shookumchuck River, near Chehalis, Washington (No. 45388, U. S. Nat. Mus.), and Newaukum River, near Chehalis. (Coll. Gilbert & Jenkins.)

2327. COTTUS KLAMATHENSIS, Gilbert.

Head $2\frac{9}{10}$ to $3\frac{1}{10}$ in length; depth $3\frac{9}{10}$ to $4\frac{1}{3}$. D. VII, 19; A. 14; P. 15; V. I, 4. Body heavy and deep, the head narrowed and wedge-shaped anteriorly, the snout rather acute and the mouth with much lateral cleft. Maxillary broadly exposed, its tip reaching vertical from behind front of pupil, its length 2⅖ or 2⅓ in head. Broad bands of teeth on jaws and vomer; palatines toothless. Anterior nostril with a distinct tube. Eye of moderate size, 1⅖ in snout, 4¾ to 5 in head. Interorbital space and occiput gently concave in adults, the total interorbital width 1⅓ to 1½ in orbit, the bony septum narrower. Upper preopercular spine robust, straight, directed backward, or backward and slightly upward; below this the margin of the bone is without evident spines, but bears 1 or 2 slight prominences which may be rounded or acute; anterior angle of the subopercle with a short spine directed forward; opercle ending in a short flat spine. Head with large pores, 2 pairs above front of orbit, those of the posterior pair nearest together; distant from these, a single median pore on the posterior portion of interorbital space, from which diverge 2 lines of pores around the back of the orbits; spinous dorsal short and low, the longest spine usually less than ⅔ the longest soft ray; the 2 fins very broadly joined; distance from base of last dorsal ray to base of caudal slightly less than depth of caudal peduncle; caudal short and broadly rounded, its length 1⅗ in head; pectorals very short, usually not reaching vertical from front of anal, 1⅖ in head; ventrals large, sometimes reaching vent but usually shorter, 1¾ in head; caudal with 9 (sometimes 8 or 10) forked rays; rays of other fins simple, unbranched. The variation in fin rays is shown in the following table:

	Number of specimens.	Spinous dorsal.		Soft dorsal.			Anal.			Pectoral.	
		VII	VIII	18	19	20	13	14	15	14	15
Upper Klamath Lake	21	19	2	1	18	2	....	16	5	3	18
Klamath River below lake	4	3	1	....	4	....	1	3	....	....	4
Lost River	7	7	......	3	3	....	2	4	1	2	5
Scott River	1	1	......	....	1	....	....	1	....	....	1

Skin mostly naked, the young with a narrowly oblong patch of prickles below the lateral line and under the posterior half of pectorals, these becoming gradually absorbed with age, adults being nearly or quite naked. Lateral line very incomplete, the last pore under some portion of the anterior half of soft dorsal in all our specimens from the lake. From the last pore, a shallow open groove or trace follows the course of the obsolete portion of the canal. In 4 specimens from Klamath River below the falls, and in 1 collected by Mr. R. C. McGregor in Scott River, Siskiyou County, California (a tributary of Klamath River), the lateral line is much more nearly complete, ending under the last fifth of soft dorsal. Color brownish olive, with 4 or 5 indistinct dark bars downward from back, breaking up below into narrow bars which may unite to form V-shaped markings, or often into mere irregular blotches; a narrow bar at base of tail; caudal with broad dark bars alternating with much narrower light ones; dorsal and anal with somewhat narrower oblique bars;

pectorals very conspicuously checkered, the dark and light spots on the rays arranged in vertical series. A large, strongly marked species, very abundant in Upper Klamath Lake. It is characterized by its short spinous dorsal, broadly joined to the long soft dorsal, the unbranched pectoral rays, the very incomplete lateral line, the weak development of prickles, the lack of palatine teeth, and the distinctive coloration. It is most nearly related to *C. perplex.* Klamath Lakes, Oregon.

Cottus klamathensis, GILBERT, Bull. U. S. Fish Comm. 1897, 10, figure, Upper Klamath Lake, Oregon. (Type, No, 48226, U. S. Nat. Mus. Coll. Gilbert, Cramer, and Otaki.)

2328. COTTUS ALEUTICUS, Gilbert.

Head small, 3¼ to 3½; depth 5 to 5⅓. D. IX or X, 18 or 19; A. 13 or 14; P. 13 to 15; V. I, 4; C. 8 or 9 (forked rays); 35 to 37 pores in lateral line. In appearance resembling *Cottus philonips;* the head small, its width but ¼ greater than its depth; the body low and but little compressed, the depth at shoulders but little greater than the width. Caudal peduncle moderate, not slender, its length from base of last anal ray 1⅔ to 1⅘ in head, measured from last dorsal ray but little more than ½ as long. Depth of caudal peduncle 4⅕ to 4⅓ in head. Mouth small, variable, maxillary reaching vertical from front or middle of pupil, 2⅗ to 3 in head. Vomerine patch of teeth small, the palatines toothless. Preorbital as wide as eye, produced anteriorly into a convex lobe, which conceals all but the widened tip of the maxillary; both pairs of nostrils opening in short but evident tubes, a character not known by us to exist in other species of the genus. Eye 4⅛ to 4⅗ in head; interorbital space narrow, the least width of the bone slightly less than ½ the vertical diameter of the orbit in adults 160 mm. long, much narrower in younger specimens. In this respect our specimens differ conspicuously from the types of *U. microstoma,* in which the interorbital width is said to equal vertical diameter of eye. As in *Cottus philonips* we have but a single preopercular spine, which is straight and directed obliquely upward; preopercular margin below the spine evenly rounded; subopercular spine well developed. Lateral line complete, following outline of back to opposite last dorsal ray, where it abruptly declines to middle of caudal peduncle. Body naked, or with a narrow band of prickles extending from upper axil of pectorals along under side of lateral line. Dorsals more or less joined at base in all our specimens, but varying in the height of the connecting membrane, which usually joins well up on first ray of soft dorsal, sometimes at its extreme base. The spinous dorsal is long, with 9 spines in 13 specimens examined, 10 spines in 5 specimens. The first 2 spines are very closely approximated, and spring from a single, wide interspinal; the first spine is easily overlooked, as has been done by Gilbert and Evermann (Investigations in the Columbia River Basin, 1894, p. 54), and possibly also by Lockington in his description of *Uranidea microstoma.* Spinous dorsal low; the soft dorsal higher, the longest rays equaling length of snout and ½ eye; the last rays when depressed not quite reaching base of caudal. Anal fin much shorter than soft dorsal, its last ray under the fourth or fifth before the last ray of dorsal; caudal truncate, slightly rounded when spread, its length 1½ to 1⅔ in head, its rays twice forked; pectorals reaching to or nearly to front of anal; ventrals varying in length, not quite reaching vent in any of our specimens; pectoral rays all simple; dorsal and anal rays all simple, except the last, which is usually divided to the base in the former, and sometimes divided in the latter. Head and body mottled or spotted above, uniformly light brown, the darker markings on back often arranged as 6 cross bars, of which 2 are below spinous dorsal, 3 below soft dorsal, and 1 on caudal peduncle, these usually broken up into spots or reticulations, and often obscure, sometimes wanting; usually a light bar downward and backward from eye; rays of dorsals, pectorals, and caudal crossed with series of dark blotches; ventrals and anal light, very obscurely barred with darker. This species was very abundant in the small streams passing through the village of Iliuliuk, Unalaska, living both in the upper, strictly fresh-water portion of the stream, and in the lower, more or less brackish part. A specimen transferred to the salt-water aquarium on the *Albatross* seemed to suffer no inconvenience from the change of water, and lived for several days. This is probably the *Uranidea microstoma* of Lockington, based on specimens collected near St. Paul, Kadiak, and considered by the describer to be identical with other specimens examined by him from the Aleutian Islands. Four specimens were collected by us May 26, 1889, in a small stream entering Departure Bay, Vancouver Island. These exhibit perfectly the differences separating *Cottus aleuticus* from its nearest ally, *Cottus philonips*. (Gilbert.)

Uranidea microstoma, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 58, St. Paul, Kadiak Island (Coll. W. J. Fischer); not *Cottus microstomus*, HECKEL, a European species.

Cottus aleuticus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 418, streams of Unalaska; also in Departure Bay, Vancouver Island. (Coll. C. H. Gilbert).

2329. COTTUS MINUTUS, Pallas.

Head 3½. D. VII, 18; A. 13; C. 13; P. 14; V. 2. Head large, conic, the upper jaw longer, the teeth very slender; eyes small, near together; preopercle with an incurved spine on each side, its lower margin subdentate; the head otherwise unarmed; body terete, thick anteriorly, tapering behind; the lateral line unarmed. Color pale, dotted with large dusky, irregular black spots on the back; fins all variegated, the pectorals translucent, with rows of dusky spots; ventrals white, with dusky rings; second dorsal variegated; anal dotted with dusky, caudal with dusky bands; body smooth. Island of Talek, near Tauisk, Sea of Okhotsk; known from a dried specimen 3 inches long, and a drawing. (Pallas.) Evidently close to *Cottus aleuticus*, but not to be identified without new material from Siberia. (*minutus*, very small.)

Cottus minutus, PALLAS, Zoogr. Rosso-Asiat., III, 145, 1811, Talak Island, Sea of Okhotsk. (Coll. D. D. Merk).

2330. COTTUS BELDINGII, Eigenmann & Eigenmann.

Head 2¾ to 4; depth 4 to 5. D. VI to VIII, 15½ to 18; A. 11 to 13; V. I, 4. Head rather short and broad, the profile convex, more steep from eye forward; eye large, orbit 4 to 5 in head; interorbital concave, 2 in orbit; mouth large, maxillary reaching at least to below the pupil, about 2 in head. Preopercle with a simple backward-directed spine, very slightly curved upward. Teeth on jaws and vomer, none on palatines. Skin smooth. Pectorals reaching vent, or further in the young; ventrals 1⅛ to 2 in head. Distance of anal from caudal 1⅛ in its distance from snout. Anus nearer insertion of caudal than to end of snout. Mottled with black and white; about 6 blackish cross bars on back, the first across head just behind eyes, next at origin of dorsal; first dorsal tinged with rusty, the second less so; all the fins except the ventrals spotted with dark. The ground color varies greatly with the bottom over which these fishes live. (Eigenmann.) Streams of Columbia River Basin, south to Lake Lahontan; abundant east of the Cascades. We find this species abundant in shallow water in Lake Tahoe. Except by the stouter body, we are unable to separate it from *Cottus philonips*, and perhaps Gilbert & Evermann are right in identifying it with the latter. We refer to *Cottus beldingii* most of the specimens called *Cottus philonips* by Dr. Gilbert and Dr. Evermann, with the remark that the name *Cottus beldingii* is in any event prior to *Cottus philonips*.

Cottus beldingii is a small-headed form, typically with perfectly smooth skin and unarmed palatines. Like most other species of the genus it occasionally develops a band of postaxillary prickles, which are often accompanied in the same specimens by a small patch of teeth on the palatine bones. The head is less strongly armed than usual, the single preopercular spine being short, the preopercular margin otherwise wholly unarmed. In this respect *C. beldingii* differs from all other western species of *Cottus*, except the Alaskan form above mentioned. The dorsal varies from VII or VIII, 16 to 18; the anal from 12 to 14. The nostrils are without tubes, and the preorbital little produced, exposing the greater part of the maxillary in closed mouth. Specimens were obtained in the Port Neuf River near Pocatello, at Snoqualmie Falls, and in a spring branch emptying into the South Fork of the Cœur d'Alene River, near Wardner, Idaho. We have also seen specimens taken from Birch Creek, in western Idaho, by Merriam and Bailey. (Named for Lyman Belding, of Stockton, California, well known as an ornithologist.)

Cottus beldingii, EIGENMANN & EIGENMANN, Amer. Nat., XXV, 1891, 1132, Lake Tahoe (Coll. Lyman Belding and C. H. Eigenmann), and Donner Lake (Coll. Eigenmann).

2331. COTTUS PHILONIPS, Eigenmann & Eigenmann.

Head 3⅘; depth 6. D. IX–17; A. 13; eye 4 in head; maxillary 2⅗; highest dorsal spine 3; highest soft ray 2¼; pectoral ⅞; caudal 1⅓. Body extremely slender, not much compressed; caudal peduncle moderate. Head small, wedge-shaped, as viewed from above; from the side the upper profile is broadly rounded from the dorsal to the tip of the rather sharp snout, lower profile straight; mouth moderate, the maxillary reaching to middle of eye; teeth on jaws and vomer, palatines toothless; interorbital space equals ½ eye; eye about equal to length of snout; preopercle with only 1 small spine above, below which its edge is entire; pectoral reaching front of anal or past; dorsals not connected, the highest spine about $\frac{2}{3}$, the highest soft dorsal $1\frac{1}{3}$, in head; ventrals reaching to vent. Color light gray, covered with many spots forming reticulations on sides and top of head; ventrals white, other fins covered by wavy, dark bars; dorsal entirely dusky, with a narrow white edge; belly and lower parts white. Fraser River Basin. Here described from one of the type specimens, 3 inches in length; collected at Field, British Columbia, in Kicking Horse River, by Dr. Eigenmann. This has been compared with many specimens of *Cottus beldingii* from localities in Washington and Idaho and from Lake Tahoe. All of these are less slender than the types, the depth being $4\frac{1}{2}$ to 5 inches in length, but they do not differ otherwise, and later investigations will probably show the entire identity of *Cottus philonips* with *Cottus beldingii.*

This name (*Cottus philonips*) was proposed as a substitute for *Cottus minutus,* Pallas, supposed to be preoccupied, and *Cottus microstomus* (Lockington), not of Heckel; but the original description was taken from a specimen from Kicking Horse River. The first mentioned is perfectly available, but was applied to a specimen from the island of Talek, near Tauisk, in the Okhotsk Sea. It is very doubtful, therefore, whether *Cottus minutus* should be used for any American species in advance of comparison with the Siberian form. From the Aleutian Island species (*C. microstomus* Lockington, *C. aleuticus* Gilbert), *C. philonips* differs in many important respects, and is undoubtedly distinct. Thus the Alaskan form has the posterior nostrils in short, but conspicuous tubes, the preorbital produced into a lobe which conceals all of the maxilary except the extreme tip, and the dorsal fin with 8 or 9 spines and 18 to 20 soft rays. (*φιλέω*, to love; *νίψ*, snow, *νιπτω*, to wash.)

Cottus philonips,[*] EIGENMANN & EIGENMANN, Amer. Nat., XXVI, 963, 1892, Kicking Horse River, Field, British Columbia; EIGENMANN & EIGENMANN, Bull. U. S. Fish Comm. 1894, 118; GILBERT & EVERMANN, Bull. U. S. Fish Comm. 1894, 204, in part, includes *Cottus beldingii.*

2332. COTTUS ANNÆ, Jordan & Starks.

Head $3\frac{1}{2}$ to $3\frac{3}{4}$; depth 5. D. VII or VIII, 17 or 18; A. 12; eye 5 in head; maxillary $3\frac{2}{3}$; highest dorsal $3\frac{1}{2}$; highest soft ray 2; pectoral 1; ventral $1\frac{2}{5}$; caudal $1\frac{1}{4}$. Body elongate, not much compressed; caudal peduncle wide, wider than length of snout. Head small, broadly rounded anteriorly as viewed from above, snout blunt as viewed from the side; mouth very small, without so much lateral cleft as *Cottus philonips;* the maxillary reaching to front of pupil; teeth in moderately wide bands on jaws and vomer, palatines toothless, or with a few teeth in a narrow band on front; interorbital (bone only) equals $\frac{1}{2}$ eye; eye smaller than length of snout; preopercle with only 1 small blunt spine, below which the edge is entire.

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[*] This species is thus described by Eigenmann & Eigenmann: Head about $3\frac{3}{4}$ to 4. D. VIII or IX, 16 to 18; A. II, 13; V. I, 4. Pectoral reaching anal or past vent even in largest specimens. Anal equidistant from tip of snout and base of caudal or nearer tip of snout. Ashy gray with blackish blotches. No well-defined cross bars excepting sometimes near the tail. Frequently a dusky blotch on anterior part of spinous dorsal and another near its posterior end; the fin sometimes wholly dusky, margined with white. Pectorals, soft dorsal, and caudal more or less barred. The types taken in the icy waters of the Kicking Horse, at Field, British Columbia, with *Coregonus coulteri.* (Eigenmann.)

Pectoral barely reaching front of anal; spinous dorsal very low, from ½ to ⅔ as high as soft dorsal, its base from its first spine to first ray of soft dorsal 1¼ in head; dorsals barely meeting, not at all connected. Color light gray, somewhat mottled; ventrals and anal colorless, other fins crossed with wavy lines; a soft spot on each end of spinous dorsal. Eagle River, a tributary of Grand River, Colorado, Colorado River Basin. Here described from 4 specimens from 2½ to 3½ inches in length, collected at Gypsum, Colorado, from the Eagle River. It has hitherto been confounded with *Cottus semiscaber*, which was taken in abundance at the same place and recorded as "*Cottus bairdii punctulatus.*" We have compared this species with specimens of *Cottus beldingii* from Birch Creek, Idaho, and with a cotype of *Cottus philonips* from Field, British Columbia. It differs from both of these in having the mouth and eyes smaller, and from the Field specimen in having a deeper body. (Name for Miss Anna Louise Brown, artist of the Hopkins Seaside Laboratory.)

Cottus annæ, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1896, 223, with plate, Eagle River, Gypsum, Colorado. (Coll. Jordan, Evermann, Fesler & Davis. Types, Nos. 1305, 1308, 1309, and 1310, L. S. Jr. Univ. Mus.)

2333. COTTUS SPILOTUS (Cope).*

This species is thus described: "D. VIII, 17; A. 13; V. I, 4; P. 15; branchiostegals 6. Entering the section with 5 ventral rays, and with an elongate body, resembling apparently the *bairdii*, except in its short and anteriorly situated ventral fins. In *wilsonii* the eye is smaller, and frontal width greater; the pectoral rays are branched, in the present species simple. In *richardsonii* the vent is said to be the median point of distance from the muzzle to the caudal fin; here it is much nearer the muzzle. In *cognatus* we are informed that the anal fin has a more posterior position. The length of the head is contained 3 times plus 1 orbital diameter from end of muzzle to base of caudal fin; said diameter enters 4½ times length of head, and is ⅓ greater than interorbital width. The head is slightly contracted laterally, and not so depressed as in *C. alvordii*, giving the orbits less vertical range. One preopercular spine. Insertion of pectorals oblique, rays undivided, reaching anus and anterior rays of second dorsal; ventrals below middle of pectoral, insertion in advance of dorsal, extending halfway to vent. Width of isthmus equal from border of (closed) premaxillary to opposite hinder margin of pupil. Dorsal outline low, regularly descending to near end of second dorsal. Greatest depth enters 5 times from end of muzzle to base of caudal. Lateral line disappears between middle and end of caudal. First dorsal low, first ray ¾ of second, third, and fourth; anal begins opposite fourth ray of second dorsal. Caudal fin rather small, rays once divided. No trace of palatine teeth. Above brown, below yellowish, everywhere densely punctulated with darker, except between the vent and anterior to ventral fins; dorsal, caudal, and pectoral fins barred; anal yellowish; base of caudal and dorsal spots

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*Dr. Bean records a fish from York Factory, Hudson Bay, under the name *Uranidea spilota*, Cope, "D. IX, 18; A. 12; V. I, 4. One specimen measuring 4 inches without tail, which is wanting. Vomerine teeth only." (Bean, Proc. U. S. Nat. Mus. 1881, 127.)

blackish; large lateral round spots of the same color sometimes in 7 or fewer cross-bars. Length 3 inches. Several specimens from Grand Rapids, on the Grand River, which flows into Lake Michigan." (Cope.) A little-known species apparently close to *Cottus beldingii*. On the types of this species we have the following notes: It has now no evident teeth on the palatines and the ventral rays are I, 3.[*] The skin is smooth, and the preopercular spine, although prominent and directed upward, is not hooked. The spots on the body are less sharply defined than in *Cottus ricei*, with which Jordan & Gilbert first identified it. (Jordan, Cat. Fish. N. A., 111.) (σπιλωτός, spotted.)

Uranidea spilota, COPE, Proc. Ac. Nat. Sci. Phila. 1865, 182, Grand River at Grand Rapids, Mich.; JORDAN & GILBERT, Synopsis, 954, 1883.

2334. COTTUS LEIOPOMUS, Gilbert & Evermann.

Head 3½; depth 5½. D. VII–17; A. 12; P. 13; V. I, 4. Eye 4⅘; snout 3⅙; interorbital width 7¼. Least depth of caudal peduncle about equaling length of snout; interorbital space very narrow, much less than diameter of eye; mouth small, maxillary reaching vertical from middle of eye, a wide strip visible laterally in the closed mouth. Preopercular spines entirely absent, the preopercular margin evenly rounded throughout, without prominence, and without the least trace of a spine. Vomer with a very narrow band of teeth; palatines naked; skin wholly naked; lateral line complete. Dorsal fins not joined unless at extreme base; fins all low, the pectorals barely reaching front of anal under third ray of second dorsal, its last ray under fourth from last ray of latter. Free portion of caudal peduncle (behind last anal ray) 1⅔ in head; portion behind base of last dorsal ray 3 in head; neither dorsal nor anal reaching base of caudal when depressed. Color in alcohol, head on sides rather finely vermiculated with light and dark; plain whitish below; not coarsely spotted or blotched as in *C. philonips;* dorsal bars indistinct; 2 narrow black lines downward and backward from eye; an evenly convex dark bar at base of caudal; dorsals, pectorals, and caudal faintly cross-barred. Length about 3¼ inches. Upper Little Wood River, Shoshone, Idaho. Closely related to *Cottus philonips*, but remarkably distinguished by the lack of preopercular spines. (Gilbert & Evermann.) (λεῖος, smooth; πῶμα, opercle.)

Cottus leiopomus, GILBERT & EVERMANN, Bull. U. S. Fish Comm. 1894, 203, pl. 20, Upper Little Wood River, Shoshone, Idaho. (Type, No. 45389, U. S. Nat. Mus.; Cotype, No. 1151 L. S. Jr. Univ. Mus. Coll. H. H. Kinsey.)

2335. COTTUS PRINCEPS, Gilbert.

Head 3½ to 3⅚ in length; depth 5 to 5⅘. D. VI or VII, 21 to 23. A. 16 to 18; V. I, 4; P. 15. A slender form with small, narrow head, which is nearly quadrate in cross section, the opercles and cheeks being subvertical, the greatest width of head but ⅕ or ⅙ more than its depth at occiput. Mouth small, oblique, the gape slightly curved, the maxillary reaching a vertical crossing eye in front of pupil, 2⅗ to 3 in head. Eye equaling snout, 4⅓ in head. Teeth small, uniform, in narrow bands in the jaws; vomer with a narrow patch; palatines smooth. Eyes small, separated by a narrow, flat interspace, as wide as pupil. Margin of preopercle evenly rounded, without developed spine, a minute spinous point sometimes occupying the position of the upper preopercular spine; opercle without spine; tubes and pores of head extraordinarily developed. A series of 6 very large pores across cheek and on lower edge of preorbital; a large median pore at symphysis, and a series of 7 occupying each ramus and extending onto edge of preopercle; similar somewhat smaller pores form the supraorbital series. Branchiostegals 6. Gill membranes broadly united to the isthmus, without free fold; no pore behind last gill. Dorsal and anal fins very long and low, the dorsal spines very slender, the notch shallow between spinous and soft portions; pectorals reaching beyond front of anal; ventrals usually to vent. About ⅔ of our specimens have the back and sides completely invested with minute close-set prickles, the head and belly and a narrow area along base of anal naked; caudal peduncle also naked in varying degree. In the remaining third (possibly males) the body is smooth except for a postaxial band of prickles, and in 1 specimen these are absent, leaving the body entirely naked. Lateral line variously incomplete, interrupted at some point under posterior half of second dorsal. Color light olive with darker markings, which may, on the head, take the form of vermiculating lines; 7 quadrate dark blotches along base of dorsal fin, the first and third usually narrower than the others, an eighth on back of caudal peduncle; very distinctly marked individuals show a series of blotches along middle of sides, which may be connected with the dorsal series by broad dusky bars; dorsal, caudal, and pectoral with faint bars; ventrals and anal unmarked. We subjoin table of fin rays in 12 specimens:

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[*] This is perhaps an error in our notes. The type can not now be found in the collection at Philadelphia.

	Dorsal spines.		Dorsal rays.			Anal.			Pectoral.	
	VI.	VII.	21.	22.	23.	16.	17.	18.	14.	15.
Specimens	3	9	7	4	1	2	7	3	1	11

Numerous specimens were obtained in shallow water along the shore of Upper Klamath Lake on a bottom of fine sediment and vegetable débris. This differs widely from any other species of *Cottus* in the very narrow, slender form, the long fins, and especially in the extreme development of the mucous tubes and pores. Klamath Lakes, Oregon. (Gilbert.) (*princeps*, chief.)

Cottus princeps, GILBERT, Bull. U. S. Fish Comm. 1897, 12, figure, Upper Klamath Lake, Oregon. (Type, No. 48227. Coll. Gilbert, Cramer, and Otaki.)

730. URANIDEA, De Kay.

Uranidea, DE KAY, New York Fauna: Fishes, 61, 1842 (*quiescens*=*gracilis*).

This genus is very close to *Cottus*, from which it differs in the reduction of its ventrals to a concealed spine and 3 soft rays, a step further in the degeneration characteristic of fresh-water types. The skin is smooth, or very nearly so, the preopercular spines small, and there is usually no trace of teeth on the palatines. Cold streams and springs of the United States from New England and the Great Lakes to the Pacific Coast. (*οὐρανός*, sky; *εἶδον*, I looked; *i. e.* stargazer.)

a. Palatines with teeth.

b. Dorsal VIII, 16; preopercle armed with 4 spines, the longest about 2 in eye: least depth of caudel peduncle 12 in length of body. BENDIREI, 2336.

bb. Dorsal VI, 19; preopercle with a single short spine; least depth of caudal peduncle 8⅓ in length of body. GREENEI, 2337.

aa. Palatines toothless.

c. Anal rays 14 or 15; dorsal spines 7 or 8.

d. Preopercular spine short, bluntish; first dorsal dark, with pale margin. MARGINATA, 2338.

dd. Preopercular spine well developed, broad, rather sharp, curved upward. TENUIS, 2339.

cc. Anal rays 12 or 11.

e. Preopercular spine curved upward more or less abruptly.

f. Head large, about 3½ in length.

g. Mouth small, the maxillary barely reaching past front of eye; pectorals short, not reaching anal; preopercular spine short, hooked abruptly upward, body very robust. FRANKLINI, 2340.

gg. Mouth larger, the maxillary reaching middle of eye; pectorals usually reaching past front of anal; preopercular spine stoutish, little hooked.

h. First dorsal nearly as high as second; anal prickly. KUMLIENII, 2341.

hh. First dorsal much lower than second; axil not prickly, so far as known; pectorals variable, usually long. GRACILIS, 2342.

ff. Head small, 4½ in length. FORMOSA, 2343.

ee. Preopercular spine sharp, nearly straight, directed backward rather farther than upward; head narrowed forward. HOYI, 2344.

2336. URANIDEA BENDIREI (Bean).

Branchiostegals 6; D. VIII, 16; A. 12; V. I, 3; P. 15; C. 15. The length of the type is 2.7 inches (69 mm.) to the base of the caudal. The greatest height of the body at the origin of the dorsal equals its greatest width over the base of the pectorals, and is contained nearly 4 times in its length without caudal. The least height of the tail is $\frac{1}{12}$ of the length without caudal. The length of the middle caudal rays is contained 4½ times in the length of the body. Width of the mouth equals ½ the length of the head. The maxillary extends a little behind the front margin of the eye. The snout is as long as the eye. The distance between the eyes is less than their diameter, and is contained 5 times in the length of the head; the diameter of the eye 4 times. The length of the lower jaw equals ½ the length of head. Preoperculum armed with 4 spines, the largest at the angle, and is about ½ as long as the eye; the 3 anterior ones are very small and hidden by the skin. The distance of the spinous dorsal from the snout is ⅓ of the length of the body; the length of the longest spine of the first dorsal is about ⅓ of that of the head and about ⅔ of the longest dorsal ray. The longest dorsal and anal rays are equal. The length of the anal base almost equals the length of the head. The length of the second dorsal base is a little greater than the length of the head. The pectorals reach to the origin of the anal; ventrals do not reach to the vent. Vomerine and palatine teeth present. Skin smooth. Color uniform dark brown above, lighter on the throat and belly. (Bean.) Eastern Oregon and northern Idaho, in the Columbia Basin. ("I take pleasure in dedicating this species to Capt. Charles E. Bendire, an excellent collector and observer, who has contributed so much to the Museum.")

Potamocottus bendirei, BEAN, Proc. U. S. Nat. Mus. 1881, 27, Walla Walla, Washington. (Type, No. 24196. Coll. Capt. Chas. Bendire.)
Uranidea bendirei, JORDAN & GILBERT, Synopsis, 696, 1883.

2337. URANIDEA GREENEI, Gilbert & Culver, new species.

Head 3⅓ in length; depth 4½; eye 3¾ in head; snout 3¾; interorbital width (bone only) 9; caudal peduncle very deep, its least depth 2½ in head. Dorsal VI, 19; anal 12; pectoral 14 or 15, ventral I, 3. Head broad with rounded profile, viewed from above, the snout and interorbital region slightly convex, the occiput flat or slightly concave. Mouth large, horizontal, the maxillary extending as far back as vertical from center of pupil, 2⅓ in head. Vomer and palatines with broad bands of teeth. A single preopercular spine, rather short, directed somewhat obliquely upward. Lateral line incomplete, ending under fifteenth ray of second dorsal; a small patch of prickles behind the axil, and a few along base of second dorsal. Spinous dorsal high, its longest spine exceeding length of snout, 2⅓ in head; longest ray of second dorsal about 2 in head; last dorsal spine joined by membrane to base of first soft ray; last dorsal rays reaching with their tips to base of caudal; pectorals reaching to or beyond vertical from first anal ray; pectoral rays all unbranched; ventrals not quite reaching vent. Olive brown above and on sides, light below; 2 short dark bars under spinous dorsal, both, or the hinder one only, continued upward to form a black blotch on the fin; a conspicuous dark bar under anterior, and 1 under posterior third of second dorsal, with a shorter fainter one midway between them; a vertical bar at base of caudal; area below lateral line with a series of 6 or 7 vertically oblong dark blotches, more or less distinctly confluent at the upper limit, to form a wavy streak, which is also joined by the darker markings of the back; a blackish streak at base of pectoral; second dorsal, caudal, and pectorals rather broadly cross-barred with dusky; ventrals and anal colorless. Length 58 mm. This species is characterized by its short spinous dorsal and its very deep caudal peduncle. Snake River Basin, Idaho; only the type known. Type locality, Thousand Springs, Snake River, Idaho, near mouth of Salmon Fall River. Collected by C. H. Gilbert, C. W. Greene, and K. Otaki, August 9, 1894. ("Named for Prof. Charles Wilson Greene, of Stanford University, to whose energy was due much of the success of the expedition.")

2338. URANIDEA MARGINATA, Bean.

Branchiostegals 6; D. VII or VIII, 18 or 19; A. 14 or 15; V. I, 3; P. 13 or 14; C. 14 or 15. Head broad, slightly depressed, its greatest length contained a little more than 3 times in length of body without caudal (4 times in total length); distance from tip of snout to eye equals length of eye, which is 4 in head. Vomerine teeth present; none on the palatines. Body stout anteriorly, moderately compressed posteriorly, its height at origin of first dorsal equal to its width at the same place, and contained 4½ times in length of body without caudal; the least width of the caudal peduncle less than ½ its height. The distance between the eyes equals ½ of their long diameter. The maxilla extends to the vertical through the end of the anterior third of the orbit. The preoperculum has a short, broad, rather blunt spine at its angle and a much smaller one on its lower limb; between these 2 the margin in some specimens is crenulated, sometimes forming an additional blunt spine. The preopercular spines are all hidden under the skin. The distance of the first dorsal from the snout is contained 2⅔ times in length of body without caudal; its longest spine is ⅓ as long as the head; the length of its base is contained 5 times in length of body without caudal, 6 times in total length; the length of the second dorsal base is ⅓ of total length. The length of the anal base is ⅓ of length without caudal. The length of the ventral is contained from 6 to 6½ times in the total length. The length of the pectoral is ¼ of length of body without caudal. The colors have faded, but the ground color seems to be plumbeous, with occasional blotches of darker; the fins are more or less distinctly punctulated; the first dorsal is darker than the body and has a distinct white margin. (Bean.) Eastern Oregon, in the Columbia River basin. Well distinguished from related species by its long anal.

Gilbert & Evermann have the following notes on this species:

Six small specimens from Mill Creek at Walla Walla (the type locality of *marginatus*) agree with Bean's description and differ from all other western specimens of *Cottus* which we have seen, in having but 3 soft rays in the ventral fins. So far as can be ascertained from our very immature specimens, *marginatus* strongly resembles *perplexus*, with which it agrees in fin rays, naked skin, the incomplete lateral line, and the absence of the palatine teeth. *Cottus perplexus* has constantly 4 soft rays in the ventral fins, and other differences may appear when compared with adult specimens. In our specimens of *marginatus*, the anus varies in position, being sometimes nearer base of caudal fin than snout, sometimes nearer snout. Twenty-two small specimens, collected by Bean & Woolman at Sand Point, Idaho, are for the present referred to this species, though we are not certain that this identification is correct. The ventrals seem to be I, 3; but the body is more or less covered with prickles. (*marginatus*, edged.)

Uranidea marginata, BEAN, Proc. U. S. Nat. Mus. 1881, 26, Walla Walla. (Coll. Capt. Charles E. Bendire.)

Cottus marginatus, GILBERT & EVERMANN, Bull. U. S. Fish Comm. 1894, 204.

2339. URANIDEA TENUIS, Evermann & Meek.

Head 3⅘; depth 7; eye 4½ in head; snout 4; V. 1, 3. D. VI-I, 17; A. 15; vomer with teeth; palatines toothless. Head long, contracted from eyes forward; snout rather long; body much compressed, very slender, greatest width of caudal peduncle 2½ in eye; least depth of same slightly greater than eye; preopercular spine well developed, broad, rather sharp, partly covered by skin, curved upward; below this 2 other spines, the anterior one blunt, the other sharp, directed toward lower base of pectoral; post-temporal spine well developed. Body smooth, wholly without prickles or scales; lateral line complete except on caudal peduncle. Color dark above and on upper ¾ of sides, pale below; dorsal fins barred with series of dark dots or blotches; caudal similarly marked but rather darker; anal light with a few dark blotches; pectorals same as caudal; ventrals plain; under side of head profusely covered with small round black specks; muciferous pores on head well developed. Klamath Lakes, Oregon. Besides the specimen described above we have 2 others of the same slender style from Pelican Bay, Upper Klamath Lake, and many others from the lake near Klamath Falls, the majority of which are much smaller and less slender. The slender ones are apparently entirely smooth; a ripe female 3 inches long has a few prickles on anterior part of body, while all the smaller ones are pretty well covered with small prickles. (Evermann & Meek.) (*tenuis*, slender.)

Uranidea tenuis, EVERMANN & MEEK, Bull. U. S. Fish Comm. 1897, 83, fig. 6, Upper Klamath Lake, Klamath Falls, Oregon. (Type, No. 48229. Coll. Meek & Alexander.)

2340. URANIDEA FRANKLINI (Agassiz).

Head 3½; depth 4½. D. VIII, 17; A. 12; V. I, 3. Body rather short and stout; snout not very obtuse; maxillary reaching about to pupil; eye 4 in head, twice the interorbital space; preopercular spine hook-like, very acute; paired fins rather short, the pectorals not reaching vent; first dorsal nearly as high as second; dorsals contiguous; anal inserted under fourth ray of second dorsal; caudal 6 in length; lateral line incomplete; vent nearer base of caudal than tip of snout. Length 3 inches. Lake Superior. (Girard.) Perhaps not distinct from *Cottus gracilis*. (Named for Sir John Franklin, the Arctic explorer.)

Cottus franklini, AGASSIZ, Lake Superior, 303, 1850, north and east shores of Lake Superior (Coll. James Hall and Louis Agassiz), GIRARD, Monograph Cottoids, 53, 1851.
Uranidea franklini, JORDAN & GILBERT, Synopsis, 954, 1883.

2341. URANIDEA KUMLIENI, Hoy.

D. VI, 17; A. 12; P. 14; V. I, 3. Body slender and elongated, its depth 6 times in length. Head large and long, 3½ in length of body, its width a little more than ½ its length, its depth a little less. Eye large, 3½ in head, about equal to snout, more than twice interorbital space. Base of pectorals crescentic, the fin about as long as head; the lower rays rapidly shortened, reaching second or third dorsal ray, and falling just short of anal, fourth and fifth rays longest. Vent equidistant between base of caudal and front of eye. Mouth pretty wide and oblique, the maxillary reaching to middle of eye; lower jaw projecting. No palatine teeth. Preopercular spine large, directed upward and backward, not strongly hooked. First dorsal rather high, ⅚ the height of the second, the second spine longest and filamentous, the 2 fins connected by a membrane. Caudal peduncle slender. Caudal fin narrow, more than ¾ length of head. Second dorsal and anal high. Lateral line disappearing under middle of second dorsal. Color obliterated, traces of a black spot on spinous dorsal. Length of specimen 3 inches. One of Dr. Hoy's types, in very bad condition, examined by us. It has grown soft in weak alcohol, and its remarkable slenderness of body is perhaps, in part at least, due to this fact. Lake Michigan, in deep water. (Named for A. L. Kumlien, the ornithologist.)

Uranidea kumlienii, Hoy, Nelson, Bull. Ills. Mus. Nat. Hist., Vol. I, No. 1, 1876, 41, Lake Michigan (Coll. Dr. Hoy); Jordan, Proc. Ac. Nat. Sci. Phila. 1877, 64.

2342. URANIDEA GRACILIS (Heckel).

Head 3½; depth 5. D. VIII, 16; A. 12. Body rather slender, fusiform; preopercular spine moderate, concealed. Mouth rather large, the maxillary reaching to the pupil; pectorals reaching front of anal; ventrals about to vent. Color olivaceous, mottled, upper edge of spinous dorsal red in life. Streams of New England and New York, recorded from tributaries of the Connecticut, Lake Champlain, Hudson, Delaware, and Susquehanna; common; probably a variable form, including several of Dr. Girard's nominal species, as Dr. W. O. Ayres vigorously insisted in 1845, before the latter had been described. (*gracilis*, slender.)

Cottus gracilis, Heckel, Ann. Wien Mus., II, 1839, 148, New York.

Cottus gobio, Ayres, Bost. Jour. Nat. Hist., V, 1845, 121.

Uranidea quiescens, De Kay, New York Fauna: Fishes, 61, 1842, Lake Pleasant, Adirondack region, New York.

Cottus viscosus,* Haldeman, Suppl. Mongr. Limnea, 3, 1840, Susquehanna River (Coll. S. S. Haldeman); Girard, Monograph Cottoids, 51, 1851.

Cottus gobioides,† Girard, Proc. Amer. Assoc. Adv. Sci. 1850, 41, and *l. c.*, 55, Lamoille River, Johnson, Vermont. (Coll. Ransom Colberth.)

Cottus boleoides,‡ Girard, Proc. Amer. Assoc. Adv. Sci. 1850, 41, and *l. c.*, 56, Windsor, Vermont (Coll. Ed. Cabot); Günther, Cat., II, 156, 1860.

Cottus copei, Abbott, Proc. Ac. Nat. Sci. Phila. 1861, 15, no locality given, probably New Jersey.

Cottus gracilis, Girard, Monograph Cottoids, 49, 1851.

Uranidea gracilis, Jordan & Gilbert, Synopsis, 699.

Uranidea viscosa, Jordan & Gilbert, Synopsis, 698.

Uranidea gobioides, Jordan & Gilbert, Synopsis, 699.

Uranidea boleoides, Jordan & Gilbert, Synopsis, 699.

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* *Cottus viscosus* is thus characterized:

Head 3½ in length; depth 4¾. D. VI, 18; A. 12; V. I, 3. Body rather stout; mucous pores on head usually numerous. Mouth small; maxillary reaching middle of eye; preopercular spine acute, extremely short, directed obliquely upward; isthmus rather narrow; first dorsal low, slightly connected with second; pectorals shorter than head, reaching second dorsal. Color olivaceous, variegated, the spinous dorsal edged with orange in life; fins mostly barred. Eastern Pennsylvania and Maryland, in tributaries of the Schuylkill, Susquehanna, and Potomac rivers; not rare, entering caves.

† *Cottus gobioides* is thus described:

Head 3½; depth 4¾. D. VII, 17; A. 12. Similar to *Uranidea gracilis*, but larger and more robust, the mouth larger, reaching to beyond the line of the pupil, and the pectorals short, not quite reaching anal; preopercular spine stout, curved suddenly upward. Length 4 inches. Tributaries of Lake Champlain. (Girard.)

‡ *Cottus boleoides* is thus characterized:

Head 3½; depth 5½. D. VIII 17; A. 11. Slender, subfusiform. Mouth rather large, the maxillary extending to opposite the pupil; preopercular spine acute, directed obliquely upwards; isthmus narrow. Fins larger than in any other species; pectorals reaching fourth ray of anal. Length 3¼ inches. Connecticut Valley, in Vermont. (Girard.)

2343. URANIDEA FORMOSA (Girard).

Head 4¼. D. VIII–16; A. 11; V. I, 3. Body slender and graceful; head small, depressed above; eye moderate; preopercular spine short, stout, acute, curved upward, a small spine below it; subopercular spine well developed. Dorsals well separated; anal beginning under third ray of soft dorsal; pectorals not reaching to posterior margin of spinous dorsal; ventrals not nearly to vent. Length 3¼ inches. Deep water in Lake Ontario. (Girard.) A doubtful species, known only from 1 mutilated specimen, the head shorter than in *Uranidea gracilis*. (*formosus*, pretty.)

Cottus formosus, GIRARD, Monograph Cottoids, 58, 1850, Lake Ontario off Oswego, in stomach of *Lota maculosa*. (Coll. S. F. Baird.)
Uranidea formosa, JORDAN & GILBERT, Synopsis, 955.

2344. URANIDEA HOYI, Putnam.

D. VI, 15; A. 11; V. I, 3; C. 12; the first dorsal low and small, ¾ as long as soft part, and connected to it by membrane. Fins all low. (Hoy.) Body small, rather short and thick, the depth about 5½ in length. Head 3⅓ in length to base of caudal. Eyes large, high up, and close together, about equal to snout, 3⅔ in head, 3 times the interorbital space. Head rather narrow and contracted; the lower jaw narrowed and slightly projecting. No palatine teeth; maxillary reaching anterior border of eye, or a little beyond. Preopercular spine prominent, sharp, very nearly straight, directed backward, but not strongly upward, its form and direction peculiar in this genus. Below this is another sharp, prominent spine, also nearly straight, directed partly downward; one or 2 minute concealed spines still lower. Isthmus well developed. Pectoral fins long, longer than head, reaching beginning of anal; ventral fins long, reaching almost to vent. Vent midway between snout and base of caudal, in the female farther back, owing to the distended abdomen. Ventral rays I, 3 (on one side of each specimen apparently I, 4; perhaps a soft ray has been split). Color nearly obliterated. Lower parts profusely punctate. Length of specimens 2⅙ inches. Lake Michigan in deep water. Female specimen taken 12 miles off Racine, Wisconsin, in 12 fathoms, June 4, 1875, by Dr. Hoy; the male off Milwaukee, June 15. The specimens are now in bad condition from rough handling. The female is distended with ripe eggs, so that the width of the body is ⅓ the total length. This species seems to be quite distinct from all those described by Girard. The peculiar characters are the number and form of the preopercular spines, the contracted mouth, the large eyes, the small size of the body, and the length of the ventral fins. The characters first mentioned are the most striking. (Named for Dr. Philo R. Hoy, of Racine.)

Uranidea hoyi (PUTNAM MS.) NELSON, Bull. Ills. Mus. Nat. Hist., Vol. I, No. 1, 1876, 41, Lake Michigan (Coll. Philo R. Hoy); JORDAN, Man. Vert., 244, 1876; JORDAN & COPELAND, Bull. Buff. Soc. Nat. Sci. 1876, 41; JORDAN, Proc. Ac. Nat. Sci. Phila. 1877, 63; JORDAN & GILBERT, Synopsis, 700, 1883.

731. MYOXOCEPHALUS (Steller) Tilesius.

(Great Sculpins.)

Myoxocephalus, Steller MS. 1741.
Myoxocephalus, Tilesius, Mém. Acad. Sci. Petersb., IV, 1811, 273 (*stelleri*).
Acanthocottus, Girard, Proc. Bost. Soc. Nat. Hist., III, 1849, 185 (*grœnlandicus*).
Cottus, Putnam, Bull. Mus. Comp. Zool., I, No. 1, 3, 1863 (*scorpius*).
Boreocottus, Gill, Proc. Ac. Nat. Sci. Phila. 1859, 166 (*axillaris*).

Body slender or robust, subfusiform, covered with thick skin, in which are sometimes embedded prickly plates; deciduous, granular, or stellate tubercles also sometimes present, but no true scales. Head large. Mouth terminal, large, the lower jaw always included, the uppermost the longer; villiform teeth on the jaws and vomer, none on the palatines; suborbital stay strong; preopercle with 2 strong straight spines above directed backward, and 1 below directed downward and forward; opercle, nasal bones, orbital rim, and shoulder girdle more or less armed; gill membranes forming a fold across the rather narrow isthmus; slit behind last gill small or wanting, if present, reduced to a mere pore; vertebræ about 28. Branchiostegals mostly 6. Dorsal fins 2, separate, the first short, its spines rather slender; ventral rays I, 3; caudal fin moderate, fan-shaped; pectoral fin broad, its lower rays procurrent. Lateral line well developed, its tubes sometimes provided with bony or cartilaginous plates, never chainlike nor reduced to separated pores. Species numerous, in the seas of northern regions; coarse fishes, little valued as food. (*μυοξός* the dormouse; *κεφαλή*, head; the allusion not evident).

Acanthocottus (*ἄκανθα*, spine; *κόττος*, *Cottus*):

a. Top of head covered with thin, smooth skin, having a very few warty prominences or none, and not hiding the bony occipital ridges; lateral line continuous, with concealed cartilaginous plates; Atlantic species.

b. Lateral line with regularly arranged, small bony-keeled plates, most distinct anteriorly; no stellate tubercles; a small cirrus above eye. D. VIII, 12; A. 9. BUBALIS, 2345.

bb. Lateral line unarmed or with concealed cartilaginous plates or with prickles which are not keeled or are not regularly arranged.

c. Anal fin very short, of 10 or 11 rays only; dorsal rays IX, 13 or 14; upper preopercular spine short, sharp, nearly twice the length of the next; third spine directed downward; no slit behind last gill. ÆNEUS, 2346.

cc. Anal fin of 12 to 14 rays.

d. Upper preopercular spine moderate, about as long as eye, and about twice length of next spine.

e. Last gill arch without slit or pore. D. X, 17; A. 12. SCORPIOIDES, 2347.

ee. Last gill arch with a small slit or pore behind it. D. X, 17; A. 14.

f. Interorbital space narrow, $1\frac{2}{3}$ in eye in adult; spinous dorsal low, the longest spine 8 in body. SCORPIUS, 2348.

ff. Interorbital space broader, as wide as eye; spinous dorsal higher, the longest spine 6 to 7 in body. GRŒNLANDICUS, 2349.

dd. Upper preopercular spine very long, longer than eye, reaching tip of opercular spine, 4 times length of the spine below it; a sharp postocular spine, and a similar occipital spine; no slit behind last gill. D. IX, 15; A. 14. OCTODECIMSPINOSUS, 2350.

MYOXOCEPHALUS:

aa. Top of head covered with small warty prominences.

g. Supraocular spine with 2 or 3 diverging digitate ridges behind it; skin of top of head thin, not concealing the bony occipital ridges; lateral line continuous; upper preopercular spine long; no stellate plates on sides below lateral line; nasal spines sharp; no cirri on head.

h. Distance from supraorbital to occipital tubercle about equal to space between supraorbital tubercles; anal rays usually 12; membrane of maxillary more or less mottled. POLYACANTHOCEPHALUS, 2351.

hh. Distance from supraorbital to occipital tubercle 1½ times the distance between supraorbital tubercles; head very long and flat; dorsals well separated; anal rays usually 14; adult with round rough plates above; throat white; membrane of maxillary unspotted. JAOK. 2352.

gg. Supraocular spine without digitate spines behind it; preopercular spines short.

i. Warts on top of head not ending in cirri; nasal spines and occipital ridges not wholly concealed in the thick skin.

j. Skin of sides of back in adult covered with round stellate tubercles; spines of preopercle short, more or less hidden in the skin.

k. Supraocular spine blunt, with a blunt tubercle behind it, the cirri small or obsolete; crests moderate; soft dorsal very long, of 15 to 19 rays. VERRUCOSUS, 2353.

kk. Supraocular spine small, blunt, without tubercle behind it; supraocular and occipital spines each with a small flat cirrus; occipital crests very low; soft dorsal of 15 or 16 rays. AXILLARIS, 2354.

jj. Skin of back and sides perfectly smooth (except in very old individuals which may have hidden rough plates below the lateral line).

l. Occipital crests very low, almost concealed by the thick warty skin; body robust, the depth 4 in length; membrane of upper jaw with sharply defined black spots; throat always spotted; suprascapular spine sharp; humeral spine obscure.

m. A pale bar at base of caudal and 1 behind anal. STELLERI, 2355.

mm. No pale bar at base of caudal and none behind anal. MEDNIUS, 2356.

ll. Occipital crests strong, the space between them concave, the skin thin and with rather few warts; body rather slender, the depth 4½ in length.

n. Sides with round white spots. NIVOSUS, 2357.

ii. Warts on top of head numerous, each ending in a small cirrus; occipital crests obsolete, hidden in the thick skin; nasal spines also hidden in the thick skin; preopercular spines small, almost concealed, the second tubercle-like; spines on shoulder girdle obsolete; head broad, mouth large; skin entirely smooth, color very dark. NIGER, 2358.

Subgenus ACANTHOCOTTUS, Girard.

2345. MYOXOCEPHALUS BUBALIS (Euphrasen).

(FATHER-LASHER: LUCKY PROACH.)

Head 2⅔; depth 3⅔. D. VIII, 12; A. 9; vertebræ 12+17. Head broad, depressed, covered with soft skin, in which are many mucous pores; maxillary reaching past middle of orbit; upper preopercular spine straight, slightly longer than eye; opercular spine granulated at base; small cirri above eye and elsewhere on head, usually 1 on end of maxillary; cranial bones mostly covered by skin; lateral line with some bony plates, which are most distinct anteriorly, these very much smaller than in *Enophrys bison*, but somewhat similar in structure; interocular space very narrow, its ridges continuing backward, serrated, each ending in a sharp spine; no trace of slit behind last gill; spinous dorsal low; anal small; pectorals reaching front of anal; ventrals moderate. Colors variegated, the dark markings sometimes red, corresponding to the hue of red algæ. Coasts of northern Europe; abundant in rock pools; said to stray to Greenland, but there is no sure evidence of its occurence in any American waters. Lütken refers the Greenland records to *M. scorpius*. (Eu.) (*βούβαλις*, buffalo.)

Cottus bubalis, EUPHRASEN, Köng. Vet. Nya Abhandl. 1786, 65, Taf. 3, fig. 2, 3, Sweden; GÜNTHER, Cat., II, 164; DAY, Fish. Gt. Brit. Ireland, 51, 1880; JORDAN & GILBERT, Synopsis, 701; BEAN, Proc. U. S. Nat. Mus. 1885, 166.

Cottus maculatus, FISCHER,* Jahrb. Wissensch. Aust., Hamburg, II, 78, taf. 2, fig. 8, 1885, Barbados.

2346. MYOXOCEPHALUS ÆNEUS (Mitchill).

(GRUBBY.)

Head 2¾; depth 4. D. IX, 13 or 14; A. 10 or 11; V. I, 3. Head rather broad, covered with smooth thin skin; no cirri; a few very small warts between occipital ridges; maxillary 2⅓ in head, reaching to just beyond pupil; supraocular and occipital ridges prominent, each with a low, bluntish spine; the region between the supraocular spines rather convex, the space before and behind it concave; nasal spines moderate; upper preopercular spine shorter than eye, nearly twice length of next spine, about reaching middle of opercle. Lateral line complete; each pore with a concealed cartilaginous plate, scattered, concealed asperities on skin of sides;

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*Concerning the identity of *Cottus maculatus*, Fischer, with *Acanthocottus bubalis*, Dr. Tarleton H. Bean has the following pertinent remarks:

"In a recent extract from the annals of the Scientific Association of Hamburg, Dr. J. G. Fischer has described and figured a species of *Cottus* from Barbados. The anomaly of finding a species of this genus within the tropics induced me to examine the description very carefully, to ascertain, if possible, the source of Dr. Fischer's specimen. There is no reasonable doubt that the type of his new species is the common Father-lasher of Europe, and it is a source of wonder that the species should have been misinterpreted. After a study of our examples of *Cottus bubalis* from Bergen and Christiania, in Norway, and Leeds, England, I have no hesitation in stating that they agree perfectly with the description and figure of *Cottus maculatus*. In some unknown way the locality of Dr. Fischer's specimen has been incorrectly given, and thus the describer of the supposed new species has been completely misled. The differential characters claimed by Dr. Fischer for *Cottus maculatus* do not serve at all to separate his species from *C. bubalis*. The arrangement and number of the spines on the preoperculum are precisely the same in our examples of *Cottus bubalis* as represented in the figure of *C. maculatus*. The ventral and pectoral are not longer in our specimens than they are made to appear in the figure of the alleged new species. The notion seems to have got abroad among the European ichthyologists that North America is a comparatively benighted and barbarous country, whose natural history is still in its infancy; it is perhaps owing to this impression that we are startled by information concerning the supposed occurrence of *Cottus* within the tropics, and of a species of *Platycephalus* in the Potomac River. (*Platycephalus americanus*, Sauvage, Nouv. Archiv. Mus. (2), pl. 2, fig. 3 (head only). Potomac River.) Our common little *Cottus æneus* of Mitchill has also been redescribed, from a New York specimen, under the name of *Cottus* (*Acanthocottus*) *anceps*. (*Cottus* (*Acanthocottus*) *anceps*, Sauvage, Nouv. Archiv. Mus. Hist. Nat., Paris (2), I, 1878, p. 145, pl. 1, fig. 13.) As a general rule it will be safe to intrust the novelties of fish distribution in our country to its resident ichthyologists."

dorsal spines rather low, higher than the soft rays; pectorals reaching anal; no trace of slit behind last gill. Grayish olive, much variegated with darker; no distinct paler spots; back and sides with broad, dark, irregular bars; all the fins barred; mandible mottled; throat and belly pale; membrane of maxillary unspotted. Length 6 to 8 inches. Coast of southern New England and New York; our smallest species; common in seaweeds near shore, but having a very narrow range. (*æneus*, brassy.)

Cottus æneus, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 381, New York; GOODE & BEAN, Bull. Essex Inst., XI, 13, 1879; JORDAN & GILBERT, Synopsis, 702.

Cottus scorpio, MITCHILL, Trans. Lit. and Phil. Soc., I, 1815, 381, New York.

Cottus mitchilli, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 188, 1829, New York; after *Cottus scorpio*, MITCHILL; GÜNTHER, Cat. Fish., II, 164.

Cottus (Acanthocottus) anceps, SAUVAGE, Nouv. Archiv. Mus. Paris. (2), 1, 1878, 145, pl. 1, fig. 13, New York.

Cottus nigricans, LE SUEUR, in VAILLANT, Bull. Soc. Philom., serie 8, tome VIII, No. 1, 1895. 12; no locality, with unpublished plate of LE SUEUR, 1819.

2347. MYOXOCEPHALUS SCORPIOIDES (Fabricius).

(ARCTIC SCULPIN.)

Head 3; depth 4½. D. IX or X, 17; A. 12; V. I, 3; lateral line 38. Body stoutish, tail slender. Head moderate, not depressed; jaws short, the maxillary reaching middle of the large eye; lower jaw included; top of head concave between the 2 occipital ridges; these very low, with obtuse tubercles instead of spines, these ending each in a small tentacle, which is often obsolete; preopercular spines 3, short, the upper equal to eye; the second about ½ as long, the lower directed downward; opercular spine obscure; a short humeral and a short suprascapular spine; nasal spines sharp; top of head with smooth skin. Skin nearly smooth, sometimes a few warts above lateral line. Isthmus narrow, the fold across it very narrow; no trace of slit or pore behind last gill. Dorsal fins slightly joined, the spines slender; pectorals reaching past front of anal. Coloration, dark olive, finely mottled with paler; fins dusky, with paler spots; anal with 2 oblique dark bars; a pale blotch at base of caudal. Arctic regions of America; Greenland and neighboring waters; common about Disco Bay, from which locality we have numerous specimens, received from Prof. D'Arcy W. Thompson (Coll. Lohmann). (*σκορπίος*, *scorpius; εἶδος*, likeness.)

Cottus scorpioides, FABRICIUS, Fauna Grœnl., 157, 1780, Greenland; BEAN, Bull. U. S. Nat. Mus., XV, 122; JORDAN & GILBERT, Synopsis, 702; LÜTKEN, Aft. Vidensk. Meddels. Kjöbenh., 12, 1876.

Cottus pachypus,* GÜNTHER, Cat. Fish., II, 161, 1860, Port Leopold. (Haslar Coll.)

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* *Cottus pachypus*, GÜNTHER, is thus described:

"D. IX, 16; A. 12 to 14. Two small spines above the snout, an abtuse one above each orbit, and a pair of obtuse prominences on the occiput. The impression on the crown becomes narrower posteriorly, and is nearly twice as long as broad. Three preopercular spines, 2 of which are at the angle; the upper is the longest, its length being equal to the diameter of the eye, but less than the width between the orbits. The height of the first dorsal is somewhat more than the length of the maxillary bone; the ventral terminates at a great distance from the vent, and the pectoral does not reach to the anal. Skin above the lateral line with smooth warts. Brownish, spotted with darker (colors faded). Port Leopold.

"Description of the specimen: The greatest height of the body, in front of the dorsal, is 4⅔ in the total length; its greatest width, behind the pectorals, 4 times. The tail tapers

2348. MYOXOCEPHALUS SCORPIUS (Linnæus).

(EUROPEAN SCULPIN; ULKE.)

Head 2½; depth 4¼. D. X, 16; A. 14. General characters of *Myoxocephalus grœnlandicus*, from which it differs chiefly in the smaller size, the narrower interorbital space, which is $\frac{5}{7}$ diameter of eye, and in the lower spinous dorsal, the highest spines being about ⅛ the length to base of caudal; pore behind last gill usually very small, but evident. Dark olivaceous, mottled with paler; fins dusky, with paler spots. Northern Europe and Arctic regions, not common on our coasts; recorded by Dr. Lütken from the Baltic, Finland, Spitzbergen, New Zembla, coasts of England, and Northern Asia; recorded from Eastport, Maine. (Eu.) (σκορπίος, scorpion, the root of our word sculpin.)

Ulka. LINNÆUS, Iter Scand., 325.
Cottus scorpius, LINNÆUS, Syst. Nat., Ed. x, 265, 1758, after Iter Scand.; GÜNTHER, Cat. Fishes, II, 159; BEAN, Bull. U. S. Nat. Mus., XV, 116; JORDAN & GILBERT, Synopsis, 702; LILLJIBORG, Sveriges och Norges Fiskar, 135, 1891.

2349. MYOXOCEPHALUS GRŒNLANDICUS (Cuvier & Valenciennes).

(DADDY SCULPIN.)

Head 2½; depth 4½. D. X, 17; A. 14; V. I, 3; P. 18. Head large. Eye large, equal to least interorbital width (in specimens a foot long). Mouth large, the lower jaw included; maxillary reaching posterior edge of orbit 2⅓ in head; the supraorbital and occipital spines blunt, tubercle-like, without cirrus; a small tubercular spine on front of occipital ridge; upper preopercular spine short, only reaching the middle of opercular spine, its length equaling eye, not twice that of the spine below it; opercular spine

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much posteriorly, and its height, before the caudal, is 21 times in the total length. The head is moderately broad and depressed, its length is 3⅔ in the total. The cleft of the mouth is moderate, the maxillary reaching to the vertical from the center of the eye; the snout is not very obtuse, and the upper jaw slightly overhangs the lower; there is a pair of small spines above the snout. The space between the eyes is slightly concave, and its width rather more than the horizontal diameter of the eyes; there is an obtuse protuberance above the posterior angle of the orbit, from which a slight ridge proceeds to the occipital protuberance; the latter is very little prominent, and furnished with small skinny tentacle. The impression between these 2 pairs of protuberances is shallow, and becomes narrower posteriorly, being nearly twice as long as broad. The preoperculum is armed with 3 spines, 2 of which are opposite the infraorbital, the third being situated at the inferior extremity of the bone, pointing downward. The suboperculum has a single spine anteriorly, directed downward; throat without spines. The spinous dorsal begins at a distance from the head which is rather less than the length of the impression of the crown; it is not continuous with the soft. The fourth spine is the longest, its length being somewhat less than that of the maxillary bone, and a little less than that of the ninth ray. The caudal has the posterior margin slightly convex, and its length is 6½ in the total. The anal is formed by 12 rays, and begins in the vertical from the fifth dorsal ray, and terminates a little before the opposite fin; its height equals that of the spinous dorsal. The pectoral is composed of 16 simple rays, and reaches to the vent, which is situated nearly in the middle of the total length. The root of the ventrals falls behind that of the pectoral; they terminate at a great distance from the vent, and are composed of 1 spine and 3 rays. The spine is enveloped in the same membrane with the first ray; the middle ray is the longest, flat and compressed like the interior. The lateral line is continued to the caudal, and is composed of elongate bony tubes, 38 in number. This specimen is nearly entirely smooth, exhibiting, however, some flat and smooth warts above the lateral line; it is a female. The young specimen differs from the adult one in having 14 anal rays. The colors have somewhat faded; the upper parts are brown, with some darker spots; the pectoral, dorsal, and caudal fins appear to have been spotted, the spots being arranged in bands; the lower part of the sides with several white spots."

sharp; nasal spines sharp; suprascapular spine rather strong, shortish. Sides of body above lateral line with a series of embedded prickly plates, below which are numerous scattered spines and prickles. Dorsal and anal fins high; spinous and soft dorsals about equal in height, their height more than $\frac{1}{7}$ length of body; ventrals long; pectorals about reaching vent. Dark brown above, with broad darker bars; below yellowish, the belly in the male with large pale spots; back and top of head with grayish blotches; fins brown and yellow, all of them spotted and barred. Sexual differences large, the males more brightly colored; the round white spots strongly marked, the females with rough crests on the head. Length 25 inches. New York to Greenland, common; one of the largest sculpins. Here described from specimens from Cape Cod. Very close to *Myoxocephalus scorpius*, which it replaces on our coast and of which Dr. Lütken regards it as a variety. Lilljiborg regards the 2 as identical, a view not unlikely correct. According to Ensign H. G. Dresel, *M. grœnlandicus* differs from *M. scorpius* (1) in its larger size; (2) in the greater interorbital width which in *M. scorpius* seldom exceeds $\frac{5}{8}$ of the longest diameter of the eye; and (3) in the higher spinous dorsal, the longest dorsal spine in *M. grœnlandicus* being contained 5 to 6 times in the total length of the caudal base, while in *M. scorpius* it is contained as much as 7 to 8 times in the same length.

According to Fabricius this species is abundant "in all the bays and inlets of Greenland, but prefers a stony coast clothed with seaweed. It approaches the shore in spring and departs in winter. It is very voracious, preying on everything that comes in its way, and pursuing incessantly the smaller fish, not sparing the young of its own species, and devouring crustacea and worms. It is very active and bold, but does not come to the surface unless it be led thither in pursuit of other fish. It spawns in December and January, and deposits its red-colored roe on the seaweed. It is easily taken with a bait, and constitutes the daily food of the Greenlanders, who are very fond of it. They eat the roe raw."

According to Lütken, the Greenland Sculpin (*grœnlandicus*) is not separated from *scorpius* by any character trenchant or constant. In Greenland it inhabits slight depths up to 12 fathoms; the young in 40 to 100 fathoms. There is great variation, especially in fin rays. In counting extreme cases both forms have the following range: D. IX to XI, 14 to 19; P. 15 to 19; A. 11 to 15. Normally, however, the range is D. X, 16 or 17; P. 17; A. 13 or 14. Vertebræ usually $14+25=39$, in a rare case $13+23=36$. Pyloric cæca 8, rarely 10 or 11.

Cottus scorpius, FABRICIUS, Fauna Grœnlandica, 156, 1780, Greenland.

Cottus grœnlandicus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 156, 1829, after FABRICIUS; GÜNTHER, Cat. Fish., II, 161, 1860; GOODE & BEAN, Bull. Essex Inst., XI, 13, 1879.

Cottus scorpius grœnlandicus, LÜTKEN, Vid. Medd. Kjöb., 12, 1876; JORDAN & GILBERT, Synopsis, 703; DRESEL, Proc. U. S. Nat. Mus. 1884, 252.

Cottus porosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VIII, 498, 1831, Baffins Bay. (Coll. Guédon and Ducrost.)

Acanthocottus mucosus, AYRES, Proc. Cal. Ac. Nat. Sci. 1854, 12.

Ananthocottus variabilis, GIRARD, Boston Journ. Nat. Hist., VI, 1850, 248; D. H. STORER, Hist. Fish. Mass., 26.

Acanthocottus ocellatus, H. R. STORER, Bost. Journ. Nat. Hist. 1850, 253; male.
Cottus glacialis, RICHARDSON, in BELCHER, Last Arctic Voyage H. M. S. Assistance, 1853, App. 3, pl. 24, Northumberland Sound. (Coll. Sir Edward Belcher.)

2350. MYOXOCEPHALUS OCTODECIMSPINOSUS (Mitchill).

(LONG-SPINED SCULPIN.)

Head 2½; depth 5½. D. IX, 15; A. 14; V. I, 3. Body very slender, tapering backward to the long and slender caudal peduncle. Head long and narrow; mouth moderate, the lower jaw included; maxillary not extending past eye, 2¼ in head. Upper preopercular spine extremely long, longer than in any other species of the genus, 3½ in head; longer than eye, extending to or beyond tip of opercular spine, its length more than 4 times that of the short spine below it; third spine turned downward; nasal spines strong; a strong spine at upper posterior margin of orbit directed upward and backward; occipital ridges long, low, converging behind, each ending in a similar spine, sharp and directed backward; a single sharp suprascapular spine; a sharp spine on shoulder girdle at tip of the sharp opercular spine; the usual downward-directed spines on preopercle and subopercle. Vertex nearly flat, bounded by low ridges. No cirri on head; skin of head smooth. Eye very large, as long as snout, 4½ in head, much wider than the concave interorbital space. Skin without rough tubercles; lateral line with a series of partly concealed cartilaginous plates. Dorsal fins well separated; spinous dorsal higher than soft dorsal, the spines strong, the longest nearly ½ head; pectorals reaching anal; ventrals not to vent; no trace of slit behind last gill. Olivaceous, with 4 obscure transverse dark bars, paler below; fins barred and mottled; jaws unspotted; lower side of head plain white; belly white. Length about a foot. Atlantic coast, from Labrador south to Virginia, common about Cape Cod; a strongly marked species, easily known by its long spine and by the sharp spine at the occiput, there being 18, really 20, distinct spines about the head. (*octodecim*, eighteen; *spinosus*, spined.)

Scorpius virginianus, WILLUGHBY, Hist. Pisc., App., 25, pl. 10, fig. 15 (nonbinomial).
Cottus octodecimspinosus, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 380, New York; GÜNTHER, Cat., II, 163.
Cottus virginianus, STORER, Rept. Fish. Mass., 18, 1838, coast of eastern Massachusetts; DE KAY, New York Fauna: Fishes, 51, pl. 5, fig. 13, 1842; JORDAN & GILBERT, Synopsis, 701, 1883; GIRARD, Proc. Bost. Soc. Nat. Hist.. III, 187.
Acanthocottus virginianus, STORER, Hist. Fish. Mass., 28, pl. 4, fig. 2, 1867.

Subgenus MYOXOCEPHALUS.

2351. MYOXOCEPHALUS POLYACANTHOCEPHALUS, Pallas.

(GREAT SCULPIN; KALOG.)

Head 2½; depth 4¼. D. IX or X, 13 to 16; A. 11 to 13. Body rather elongate. Head long and narrow, somewhat compressed, concave between the orbits, the orbital rim being elevated; lower jaw included; nasal spines strong; a strong ridge above eye, with a blunt, compressed spine behind it; behind this a small digitate cluster of ridges ending in low spines; behind these an irregular broken ridge on each side of the vertex, extending to the occiput; outside of this another ragged ridge; suborbital stay strong, striate; upper preopercular spine very long, straight, simple, striate at base, longer than eye; a similar but shorter spine below it, not ½ as long, and the usual downward-directed spine at lower edge of preopercle and subopercle; opercular spine moderate. Skin of top of head thin, with small, smooth warts, not hiding the occipital ridges; no cirri. Mouth rather large, the maxillary reaching beyond eye, ½ length of head; skin of body with some scattered rough tubercles, usually nearly smooth. Dorsals not very high; dorsal spines slender; pectorals reaching anal; ventrals moderate, I, 3. A minute pore usually present behind last gill, this sometimes wholly wanting. Lateral line complete. Dark olive above, much variegated with darker and reddish; belly mostly whitish; sides and belly (in males) with numerous blackish reticulations surrounding large round white spots; jaws dusky, mottled with whitish; membrane joining maxillary to preorbital black, with round white spots in the adult, more or less plain in the young; fins, all but the ventrals, mottled and barred with blackish and yellowish. Length 1½ to 2½ feet. Alaska to Kamchatka; abundant throughout Bering Sea, and southward along the islands to Puget Sound; one of the largest sculpins and everywhere familiar to fishermen. Dr. Gilbert found it abundant about Unalaska and in Bristol Bay. Mr. Scofield found it at Chignek Harbor, and we obtained it about the Pribilof * and Commander Islands and at Petropaulski. (*πολυς*, many; *ἄϰανθα*, spine; *ϰεφαλή*, head.)

Cottus polyacanthocephalus, PALLAS, Zoogr. Rosso-Asiat., III, 133, 1811, Aleutian Islands; no definite locality; GÜNTHER, Cat., II, 166; JORDAN & GILBERT, Synopsis, 704, 1883.

2352. MYOXOCEPHALUS JAOK (Cuvier & Valenciennes).

D. VIII to X, 15 to 17; A. 13 to 15 (usually D. IX, 16; A. 14). This species has a very slender body and an extremely wide, flat head, the latter strikingly triangular when viewed from above, on account of the regular way in which it tapers toward the snout. The species is further distinguished by possessing but 9 dorsal spines and by the presence in the adult of an irregular series of circular spinous plates above the lateral line, these plates wanting in very young individuals. They begin to make their appearance in specimens 6 inches long, and are invariably present in larger specimens. In adults, the region below the lateral line contains strong spinous prickles mostly concealed in the skin and directed backward. Some of the anterior ones may be broader and may have more than one point, but none is circular with a rosette of short spinous points, as is the case with the dorsal series. Lower jaw included; top of head covered with small warts; scapular spine short and sharp; humeral spine obscure; upper preopercular spine very long, nearly as long as eye, low, sharp, 3 times length of next spine, not quite reaching tip of opercular spine. Occipital crests long, gently converging behind, suddenly diverging near their posterior ends. Distance from supraorbital to occipital tubercle 1½ times the distance between the 2 supraorbital tubercles (the 2 measurements about equal in *M. polyacanthocephalus*); 2 or 3 low digitate ridges behind supraocular spine; a sharp ethmoidal ridge extends backward from level of small spines to above front of pupil; mouth very large, the maxillary extending to posterior border of eye; the pore always present behind last gill arch; spinous dorsal low, the interval between dorsals unusually long; fins moderate; pectoral barely reaching anal; ventrals not to vent. Color olive grayish, mottled with darker, paler than in related species; back with 4 dark cross bands, made up of blackish spots; lower side of head and belly plain white; membrane of upper jaw unspotted; fins, all except the ventrals, with oblique dark bars, fainter than in most species. In the adult, the dark cross bands break up into sharply defined black spots, with vermiculating blotches and lines which closely cover the back. Length 12 to 18 inches. Bering Sea, in shallow water; everywhere common on both coasts, extending into the Arctic and south to the Amur River and Unalaska. Our specimens from Unalaska, Bristol Bay, Petropaulski, Robben Reef, Port Clarence, and Grantley Harbor; one of the most characteristic fishes of Bering Sea. (*jaok*, the vernacular name in Kamchatka.)

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* Several specimens from Unalaska, where the species is abundant, and 1 from Robben Island, the latter perfectly typical in all respects and giving us the first Kamchatkan record for the species. In the Robben Island specimen, the pectoral rays are roughened on their inner surface with horny tubercles, as is usual with adult males of this species. The fin rays are: D. X, 14; A. 12; P. 18.

Cottus jaok,* CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 172, 1829, Kamchatka (Coll. Pallas; specimen in Mus. Berl. called *Cottus scorpius* by PALLAS); GÜNTHER, Cat., II, 165, 1860; JORDAN & GILBERT, Synopsis, 705, 1883.

Myoxocephalus jaok, JORDAN & GILBERT,† Rept. Fur Seal Invest. 1898.

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* *Cottus jaok* is thus described: "D VII, 15; A. 14. M. Lichenstein has kindly confided to us the individual which served Pallas for the description of the great *Cottus* of Kamchatka, which he believed the same species as our *scorpius*. We have compared it carefully with our individuals from Europe and we have found that it has, in fact, several characters, notably, that the spines of its preopercle are similarly disposed and of the same proportions, but its differences are many. Instead of tubercles it has behind the eye, behind the cranium, and on the temple, some light granulations. Along its back, above the lateral line, is a row of scales quite unlike those of *scorpius*. They are round, a little concave; their surface is rough, and their edge surrounded with small slender points, but above the lateral line there are some like those of *scorpius*. The first dorsal is lower, shorter, and I have been able to find but 7 rays. Pallas counted but 6. Its size is much greater than that of the Sculpins in Europe. The individual before us is 21 inches long. Pallas mentions them of 2 feet. He thus gives the coloration: Back reddish, with scattered brown spots, small, irregular, disappearing by degrees below the lateral line; belly white; 5 brown, irregular transverse bands on the pectoral; spinous dorsal spotted with brown; soft dorsal with 4 vertical brown bands; caudal with 3; 3 bands on the anal. The fish is very active in life. Pallas was told that it would live for 2 days out of water; even after being eviscerated and being in the smoke to dry, it would wave for several hours. It is called by the Kamtschadales *Jaok;* by the Koriakes, *Ilaal;* by the Kouriles, *Susiatki* and *Keischag* (?). The Russians of Kamchatka call it *Ramscha*, and the Lamutes, *Takfchi*. (Cuvier & Valenciennes.)"

† Concerning the synonymy of this species, Jordan & Gilbert observe: In a report on the ichthyological collections of the *Albatross* in Alaska (Report U. S. Commissioner of Fish and Fisheries for 1893, p. 421), Dr. Gilbert writes as follows: "*A. humilis* closely resembles the description of *A. jaok*, with which it may well be identical. We do not venture to make this identification, as *A. jaok* is said to have but 7 dorsal spines, a number we have not found in *A. humilis*." On further consideration we have decided that the 2 must be identical. The type of *jaok* was a large dried specimen, the same which had served Pallas for his account of *Cottus scorpius*. In such a dried specimen it would be very difficult to enumerate correctly the low feeble spines, of which the first 2 are very closely approximated, and the last 1 often minute and hidden in the membrane. *Humilis* is abundant along the coast of Kamchatka and agrees with the account of *jaok* in having the upper parts covered with small brown spots, the back with a series of round spinous plates, and the sides below the lateral line with posteriorly directed spines; it also agrees in reaching a very large size. In the description of *jaok* the fin formula, except the number of dorsal spines, is that most frequently found in *humilis*. Specimens are before

Cottus humilis, BEAN, Proc. U. S. Nat. Mus., IV, 1881, 149, Chamisso Island, Bering Straits (Coll. T. H. Bean); D. X, 16; A. 13; JORDAN & GILBERT, Synopsis, 705, 1883.
Cottus polyacanthocephalus, KNER, Sitzb. Akad. Wiss. Wien, LVIII, 1868, 21, taf. 4, fig. 11, Decastris Bay; not of PALLAS.
Cottus tæniopterus, BEAN & BEAN, Proc. U. S. Nat. Mus. 1896, 384; not of KNER.

2353. MYOXOCEPHALUS VERRUCOSUS (Bean).

D. X or XI, 15 to 19; A. 12 to 17 (usually D. X, 16; A. 13). Top of head strongly verrucose, the preopercular spine short; supraorbital and occipital filaments present. The adults have spinous plates along the sides, extremely high vertical fins, and very large supraorbital and occipital tubercles, from the summits of which the tubercles arise. Spinous plates above the lateral line similar to those found in *M. jaok*, the anterior ones at least being circular with a depressed center, and having the margin provided with a series of short, strong spines, sometimes interrupted for a short distance anteriorly. Under the soft dorsal and on the caudal peduncle the plates are smaller and less regular, being often reduced to very small plates bearing 2 or 3 prickles directed backward from the margin. Below the lateral line are plates similar to those above, but fewer. The cephalic tubercles are undeveloped in the young, but become very conspicuous in half-grown and adults. One above posterior margin of orbit and 1 at hinder edge of occiput are the largest and bear short filaments. These rise very abruptly without evident connection with ridges. Behind the supraorbital tubercle is a smaller one, sometimes accompanied by 1 or 2 still smaller elevations, recalling in their arrangement the digitate postocular ridges of *M. jaok* and *M. polyacanthocephalus*. A smaller tubercle is present also immediately in advance of the principal occipital one. Lower jaw included. Preopercular spine short, the upper one not exceeding, sometimes much less than, longitudinal diameter of orbit. A well-developed pore behind last gill. Dorsals very high, without appreciable interspace, the longest spine sometimes equaling length of snout and eye, 2½ in head, equaling the longest rays of soft dorsal. The largest specimen seen by us is nearly uniform in the coloration of the upper parts, showing but faint traces of the dark bars usually found in this group. In all other specimens these are distinctly marked, though more irregular and less sharply defined than in *M. sellaris* and *M. polyacanthocephalus*. As usual, there is a broad bar under spinous dorsal, 2 narrower ones under soft dor-

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us from Petropaulski and from Stations 3646 and 3648, off Robben Island, in 18 and 20 fathoms. All of these have the supraocular and occipital crests higher and sharper than in those from the eastern portion of Bering Sea, and the preopercular spines are longer, usually reaching in young examples to or beyond opercular margin. These are, however, characters subject to much variation within this group, in which it will always be unsafe to recognize subspecies, unless based on very extensive collections. Our 21 specimens show the following fin formulæ:

	First dorsal.		Second dorsal.			Anal.			Pectoral.	
Rays	IX.	X.	15.	16.	17.	13.	14.	15.	17.	18.
Specimens	18	3	10	10	1	1	15	5	7	14

sal, and a fourth on end of caudal peduncle; ground color unusually pale. In a highly colored male the lower part of sides is blackish, provided with roundish, large, white spots, the margins of which are often made conspicuous by a series of minute black specks; fins conspicuously barred. In most specimens a broad band of the light ground color crosses occipital region and extends backward and downward, including margin of preopercle above the spines and the greater portion of opercle. Arctic Ocean and Bering Sea; Unalaska and Bristol Bay; taken by the *Albatross* at depths of 5 to 30 fathoms, and taken by Mr. Scofield at Kings Island, Port Clarence, and Grantly Harbor; originally recorded from Plover Bay. (Gilbert.) Here described from adult specimens 10 inches long. (*verrucosus*, warty.)

Cottus verrucosus, BEAN, Proc. U. S. Nat. Mus., IV, 1881, 152, Plover Bay, Siberia (Coll. T. H. Bean); JORDAN & GILBERT, Synopsis, 707, 1883.

Acanthocottus verrucosus, GILBERT, Bull. U. S. Fish Comm. (1893) 1896, 421; SCOFIELD, in Jordan & Gilbert, Rept. Fur Seal Invest., 1898.

2354. MYOXOCEPHALUS AXILLARIS (Gill).

Head $2\frac{3}{4}$; horizontal diameter of orbit 5 in head and $1\frac{1}{5}$ in snout; interorbital space 6 in head; depth $4\frac{1}{2}$; maxillary reaching vertical with posterior edge of eye, $2\frac{1}{3}$ in head; D. IX or X, 15 or 16; A. 11 or 12; pectoral 15 or 16; caudal with 9 branched rays; lateral line 40. Head wide and depressed; mouth horizontal; lower jaw included; nasal spine well developed, but completely covered by the skin. Preopercle with a straight spine at its upper angle almost covered with skin and equal in length to vertical diameter of orbit; a second spine immediately below this, completely covered by the skin and $\frac{1}{2}$ as long as upper spine; at the lower angle of the preopercle there is a tubercle; opercle with a strong horizontal spine at its upper angle, completely embedded in the membrane and not reaching edge of gill flap. At the lower angle of the opercle there is a small, downward-directed spine, also completely covered by skin; suprascapular spine well developed, but completely embedded; humeral spine blunt and covered; occipital ridges scarcely elevated, a slight pineal elevation; 4 broad, conspicuous tentacles corresponding to the positions of the supraocular and occipital tubercles; orbital rims considerably elevated, having a flat, depressed space between them; top of the head covered with small, wart-like elevations. Lateral line inconspicuous, without plates, its pores distant and small; above the lateral line a row of osseous plates, smaller and more closely placed beneath the second dorsal; a similar scattered row below the lateral line just beneath the second dorsal; longest ray of first dorsal (the fourth or fifth) $2\frac{1}{2}$ times in head, first 6 rays about equal in length; second dorsal higher and about the same shape as the first, the longest ray $1\frac{9}{10}$ in head; caudal truncated, the corners about square; pectorals large and reaching to second ray of anal; ventrals scarcely reaching vent. Color above quite dark, strongly marked with black and white; a saddle of black under the anterior $\frac{3}{4}$ of first dorsal; 2 similar but smaller saddle markings over the back below the second dorsal, 1 beneath the anterior, the other beneath the posterior end; a black blotch on the side of the caudal peduncle, a characteristic marking in several of the members of this genus; ventral surface lighter; sides with large, ovate white spots; 4 or 5 bright cream spots at edge of the black and hidden by the pectorals; mandibles mostly black; lower lip with black mottlings; angle of mouth light; tip of maxillaries black; a black blotch at isthmus just back of membrane; first dorsal mostly black; a white blotch covering lower ½ of membranes between fourth and sixth spines; from the upper anterior angle of this blotch the white extends across the fourth spine and runs into the spot at the edge of the membrane and between the third and fourth spines; at the edge of the membrane and between each 2 spines there is a white spot, very small between first and second, but increasing in size posteriorly and between the seventh, eighth, ninth, and tenth, running together, leaving a tip of black at the end of the eighth spine; second dorsal black with a few circular white spots, each spot with its center on a fin ray and its edge reaching to middle of membrane; these spots inclined to run together; caudal mostly black, partially divided by narrow interspace of white into 2 heavy vertical bands; anal colored similar to the second dorsal; tips of rays and edge of membrane white; ventrals with several black spots; pectorals black with oval white spots on membranes, which join each other imperfectly across the rays to form 4 or 5 interrupted vertical bars of black; 2 white spots at base of rays. (Scofield.) Arctic Ocean and Bering Sea; chiefly northward. The specimens here described from Port Clarence, Chignik Bay, and Herendeen Bay. Also known from Bering Straits and St. Michaels. (*axillaris*, pertaining to the axil, or armpit.)

*Boreocottus** *axillaris*, GILL, Proc. Ac. Nat. Sci. Phila. 1859, 166, Bering Straits.
Cottus axillaris, JORDAN & GILBERT, Synopsis, 706, 1883.
Myoxocephalus axillaris, SCOFIELD, Rept. Fur Seal Investigations, 1898.

2355. MYOXOCEPHALUS STELLERI, Tilesius.

D. IX (rarely VIII), 15 (rarely 16); A. 12 (11 to 13). Resembling in shape *M. polyacanthocephalus*, the head less depressed and the snout deeper than in *M. jaok*. Characteristic features are the thickened papillose lips, the presence of a supraocular tentacle, and the peculiar coloration. Skin naked or with a few scattered small plates in adult males, the interorbital deeply concave, and the occipital and parietal ridges heavy and more or less broken or rugose. Head $2\frac{2}{7}$ to $2\frac{2}{5}$ in length; depth 4; least depth of caudal peduncle 1½ in snout; greatest width of head equaling distance from tip of snout to base of preopercular spine; depth of head at occiput equaling ½ its length. Mouth large, the lower jaw included, but less conspicuously overlapped than in *M. jaok*, the maxillary reaching beyond the eye, 2¼ in head. Lips very thick and fleshy in adults, the inner margin of each with a dense band of fine papillæ; lower lip may also bear externally a few papillæ or short filaments; a fleshy slip or filament often present on upper posterior angle of maxilla. Nasal spines pungent, rather short; preopercle with 2 diverging spines at angle and a third remote one below directed downward and forward; the upper spine varying in length, but extending usually about halfway to tip of opercular spine; opercle with a strong rib and spine; humeral and subopercular spines strong; interorbital width 5½ to 6 in head, gently concave, its floor usually with traces of 2 low ridges; a definite supraorbital tentacle borne on the anterior end of the occipital ridge, its basal tubercle never conspicuous; slender occipital tentacle often present, especially in the young, but not infrequently absent; ridges on occiput strong, often irregular or partly interrupted, their surface roughened with lengthwise lines or with clusters of granules; occiput more deeply concave than in *M. polyacanthocephalus;* usually a cluster of short digitate ridges behind the eye; top and sides of head with small, warty protuberances. A minute pore behind last gill, to be detected with difficulty in the young. Dorsals with short interspace or none, the membrane from last spine usually joining base of first soft ray; spinous dorsal very high in adult males, the fifth spine highest, ½ as long as head, longest soft ray 2⅕ in head; pectorals reaching front of anal, the ventrals not to vent; vertical fins much lower in the young. Skin smooth, without plates or spines in young 7 or 8 inches long; 1 adult male of 14 inches with scattered small subcircular spinous plates, all but a few of which are below the lateral line. In the young the maxillary and mandibular membranes are whitish, very conspicuously marked with irregular jet-black spots and blotches; branchiostegal and gular membranes and the membrane behind the preopercle crossed with narrow dark streaks; entire under side of head faintly dusky, mottled and maculated with white "like a frog's belly;" iris with small black spots and blotches; these colors fainter in our adult specimen, where the under side of head is nearly uniform whitish; the maxillary membranes, however, conspicuously black spotted; body brownish, with 3 light-gray saddles, the most conspicuous crossing the back of the caudal peduncle immediately behind the dorsal fin; the second below the dorsal notch, and the third, often obscure or wanting, forming a V-shaped area on top of head, the 2 arms diverging from interorbital space toward the base of opercular spine; the dark areas often lighter centrally, and variously blotched and mottled with brown or dusky; dorsals very irregular in the marking; anal usually with 3 or 4 oblique dark bars; caudal usually with a basal translucent bar followed by varying alternations of translucent and black; ventrals showing 2 black cross bars; pectorals with no definite color pattern on their outer face, but crossed on their inner face by a few irregular black bars. Males show the usual round white spots on sides of abdomen. It is well distinguished by the speckled throat and belly, aptly compared by Steller to the speckled color of a frog. Western shore of Bering Sea and Okhotsk Sea; not recorded from Alaska or the Aleutian Islands. This description from 11 specimens from Petropaulski and Bering Island, taken by the *Albatross.* This species is now recorded from Bering and Medni islands, Petropaulski, and the mouth of the Amur River. It is evidently abundant in western Bering Sea, but probably does not occur among the Aleutian Islands or on the Alaskan coast. There seems to be no doubt that this species is correctly identified with *Myoxocephalus stelleri,* with which it agrees in fin rays and in the peculiar and characteristic coloration. It agrees also with the description of *Cottus decastrensis,* from which the figure, however, diverges in several important details. It is highly improbable that *Cottus mertensii* and *Cottus marmoratus* can ever be satisfactorily identified, as we have only very brief accounts of them, based on colored drawings. (Named for Georg Wilhelm Steller.)

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* This species is the type of the nominal genus *Boreocottus*. Gill, thus described by Gill: "Body subcylindrical, rapidly declining to the caudal fin. Skin mostly naked, or with small and distinct tubercles above the lateral line. Lateral line opening on the sides through small distant pores. Head large, depressed, and subrhomboidal; nasal spines small; preopercle with 2 simple spines near the angle and 2 tubercles below; opercle with a longitudinal rib terminating in a spine and with a round membranaceous margin; subopercle with a spine directed downward. Postorbital longitudinal crests little developed. Mouth moderate. Teeth villiform, present on each jaw and on the front of the vomer. Branchiostegal membrane continuous under the throat, but attached along the middle of its length almost to its margin, and thus nearly restricting the branchial apertures to their respective sides. Branchiostegal rays 6. Dorsals separate, the first low, highest at the middle. Ventrals small, moderately approximated and behind the pectorals, each with a spine and 3 soft rays."

Myoxocephalus stelleri, TILESIUS, Mém. Acad. Petersb., IV, 1811, 273 with plate, not referred to in text, Petropaulski (Coll. G. W. Steller); JORDAN & GILBERT, Rept. Invest. Fur Seal Islands, 1898.

Cottus decastrensis, KNER, Denk. Kais. Akad. Wissen., XXIV, 1865, 2, taf. 2, figs. 1, 1*a*, Decastris Bay, near mouth of the Amur.

? Cottus marmoratus,[*] CUVIER & VALENCIENNES, Hist. Nat. Poiss., VIII, 497, 1831, Petropaulski; on a drawing by MERTENS.

Cottus platycephalus, BEAN & BEAN, Proc. U. S. Nat. Mus. 1896, 240, 384; not of PALLAS.

Cottus niger, BEAN & BEAN, Proc. U. S. Nat. Mus. 1896, 240, 384 (in part: Nos. 33899, 33872, 33833, 33850, 33908, 33844, and 33879); not of BEAN.

2356. **MYOXOCEPHALUS MEDNIUS,** B. A. Bean, new species.

Head 3½; depth 4½; eye 4 in head. D. VIII, 17; A. 12; V. I, 3; P. 14; C. 14. Profile of head and body gradually ascending from tip of snout to sixth dorsal spine, thence tapering to caudal peduncle; ventral line almost straight, slightly tapering to caudal peduncle; longest dorsal spine almost as long as longest ray, 3 in head including flap. Mouth moderate, maxillary reaching about to vertical through middle of eye. Pectorals large, reaching slightly beyond anal origin, the middle rays being ⅘ as long as the head; ventrals moderately well developed, reaching anal; anal origin under third ray of dorsal, ending under fourteenth ray of that fin. Gill membranes united, forming a fold across the isthmus. Preocular spines moderate; opercular spines but moderately developed; 2 flattish tubular pores, 1 on each side of front of eye; numerous pores on head; 2 rows of pores, 1 above and 1 below, the raised ridge running laterally on dorsal half of body. General color dark reddish brown, mottled, barred, and spotted with white; under parts whitish; a wide whitish bar from opercles across nape; posterior part of interorbital space whitish; the dark color on front of snout and under lower jaw relieved by bars and mottlings of whitish; pectorals and ventrals barred; rays of caudal finely mottled; several (5) small white spots on body immediately behind pectoral origin, and several larger white blotches on lower posterior half of body. Bering Sea. A single example, 2 inches long. It is allied to *M. stelleri*, from which it differs greatly in form and coloration. (Type, No. 33863, U. S. Nat. Mus. Collected at Medni (Copper) Island, Bering Sea, spring of 1883, by Dr. Leonhard Stejneger.) (B. A. Bean.) (*Medni*, the Russian name, meaning Copper, of the island where the species was found.)

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[*] *Cottus marmoratus* is thus described:

"D. 8–14; A. 12; C. 14, etc. Une seconde espèce, observée dans ces parages par les naturalistes de la même expédition, ne paraît pas non plus se rapporter à aucune de celles que nous avons décrites. Ce petit chaboisseau a deux fortes épines au-devant de l'œil. Deux autres peu alongées au bord du préopercule; une petite dirigée vers le bas au bord horizontal du même os, et une assez forte à l'angle de l'opercule. Les rayons épineux de la première dorsale sont assez robustes; le cinquième est le plus long. Ce poisson a la tête et le dos bruns, de grandes marbrures brunes et blanches sur les côtés, et rougeâtres sur le ventre. La première dorsale est jaune, avec une grande tache brune, qui part de la pointe du quatrième rayon et descend obliquement jusqu'au pied du septième. La seconde dorsale est rouge. La caudale jaune, marbrée de roux. La pectorale brune à la base et jaune ensuite. Le jaune est traversé par trois raies circulaires brunes près de l'extrémité des rayons. L'anale est blanchâtre et tachetée de nombreux points rouges. Nous ne connaissons aussi cette espèce que par un dessin long de quatre pouces, communiqué par M. de Mertens." (Valenciennes.)

Myoxocephalus mednius, B. A. Bean MS., in Jordan & Gilbert, Rept. Fur Seal Investigations, 1898, Medni Island. (Type, No. 33863. Coll. L. Stejneger.)

2357. MYOXOCEPHALUS NIVOSUS* (Herzenstein).

Head 2¼; depth 4½. D. IX, 15; A. 13; P. 17; lateral line 33 to 35. Head comparatively deep and compressed, with large mouth, narrow, deeply concave interorbital space, and depressed concave occiput, which is bounded by strong lateral crests; at the anterior end of these crests they are each accompanied on the outer side by a short ridge, and on the inner side by a still shorter ridge or a small tubercle. The occipital crests converge strongly toward the nape; temporal ridges also strong; a short filament above posterior edge of orbit and 1 at posterior end of occipital crest, each surmounting a very low tubercle. Upper preopercular spine straight, directed toward opercular flap, scarcely reaching middle of opercle, its length ⅔ diameter of orbit; the second spine is ⅜ length of upper, directed downward and backward; the third points downward and forward, the long interval between it and the second being smooth, without spine or tubercle. The contiguous angles of sub- and inter-opercles are provided with prominences which are not spine-like; opercle and suprascapula each with a strong ridge ending in a spine; no scapular spine. Nasal spines small, not projecting; top of head, nape, and suborbital ring with small warts, many of which contain openings of the mucous canals; both pairs of nostrils with short, wide tubes. Jaws and vomer with wide bands of cardiform teeth of equal size. A round pore, nearly as large as nostril, immediately behind last gill; gill membranes with a short free border mesially. Least interorbital width ⅗ diameter of orbit, which is ⅕ length of head to tip of opercular spine; greatest width of head 1⅘ in its length. Mouth large, the lower jaw included, the maxillary reaching the vertical immediately behind the orbit, its length 2⅖ in head. Third, fourth, and fifth dorsal spines nearly equal, the fifth longest, equal to length of snout and ½ eye; a very short interspace between the 2 dorsals; second dorsal very high, the longest rays equaling length of snout and eye; caudal gently rounded when spread, its length ½ that of head to end of opercular spine; ventrals reaching halfway to front of anal, equaling height of second dorsal; pectorals scarcely to vent, the length of the longest rays equaling distance from eye to tip of opercular spine; vent midway between base of caudal and base of lower pectoral ray; skin everywhere smooth. Coloration very dark on back and sides, white below, with traces of blackish cross bars below the dorsal fins; along lower part of sides a number of large roundish white spots, which are present also in a band along base of anal, becoming smaller posteriorly and toward middle of sides; sides of head and body, and especially the dorsal, caudal, and pectoral fins with scattered small spots of pearly white; spinous dorsal with large, roundish, transparent spots, the anal margined with white and marked with scattered white spots of various sizes and shapes; the thickened pectoral rays largely white; ventrals with 3 dusky cross bars; lower lip and mandible with white areas surrounded by dusky reticulations. Okhotsk Sea, the type from St. Olga Bay. Here described from a large specimen 39 cm. long from Iturup Island, one of the Kurils. (Coll. *Albatross.*) Our specimen agrees well with the description of the much smaller type (185 mm), apparently differing in the shorter pectorals and more deeply concave interorbital space. The white spots also show no tendency to run together to form streaks either along back or on the bases of the fins. (*nivosus*, snowy.)

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* Allied to *M. nivosus* is the following species from the Okhotsk Sea:
Myoxocephalus brandti (Steindachner).
Head 2⅔; depth 5. D. IX, 13; A. 11; P. 17. Head narrowed forward, the lower jaw included. Eye 6 in head, a little larger than snout; interorbital space strongly concave, 1½ in eye. A rather long tentacle above eye posteriorly; behind this a ridge, low and rather sharp, converging with its fellow, and inclosing a depressed quadrangular area; no spine at its posterior end; nasal spines prominent; preopercle with 3 spines, the upper shorter than eye, the second not ½ its length, the third short, blunt, and turned downward; opercular spine blunt, concealed; suprascapula with a single long spine. Top of head covered with small rounded warts. Lateral line with thin bony concealed plates, its pores sending numerous simple branches above and below; below the lateral line 2 rows of small cross plates, tube-like, apparently connected with the system of tubes of the lateral line; no rounded bony plates or scales. Longest dorsal spine 3 in head; pectoral moderate, a little more than ½ head; ventral 2½ in head. Head bluish violet above; sides of body reddish yellow; violet marblings on the lower lip and on the sides of the lower jaw, leaving the ground color to form ocellated spots; fins violet with yellow spots, the ventrals uniform yellowish. Known from 1 specimen 13 inches long from the mouth of the Amur River. (Steindachner.) (Probably named for the natural history collector, Brandt.)

Cottus brandti, Steindachner, Ichth. Notizen, v, 6, Taf. 3, figs. 1, 2, 1867, mouth of the Amur River. (Type, in Vienna Mus.)

Cottus nivosus, Herzenstein, Mélanges Biologiques du Bull. Acad. Imp. Sci. Petersb., XII, 113, 1890, St. Olga Bay.

Myoxocephalus nivosus, Jordan & Gilbert, Rept. Fur. Seal Invest., 1898.

2358. MYOXOCEPHALUS NIGER (Bean).

(Black Sculpin.)

Head 2½. D. IX or X, 16; A. 11 or 12; V. I, 3; P. 16; B. 6. Nasal spines blunt, covered with skin; no spines above orbits or on occiput; no sharp spines on head except the 2 upper preopercular spines, which are almost concealed; the uppermost as long as eye, 6 in head, and equal to snout or interorbital space; top of head with fine dermal granulations, the vertex with numerous slender tentacles; a soft tentacle of moderate length above eye; jaws equal, the lower slightly included; maxillary longer than fourth dorsal spine, 2 in head, reaching hinder margin of orbit. Caudal and ventrals each ½ length of head; pectoral not reaching vent; skin smooth. A small slit behind last gill. Color typically, almost black; sides mottled with lighter brown, sometimes with round white blotches on belly and sides; pectoral plain or with white blotches. Specimens from granitic rocks have sanded coloration corresponding to the hue of the surroundings. Pribilof Islands; very abundant in the crevices of black lava rocks of St. Paul and St. George. Also obtained in some abundance about the Komandorski Islands, Medni and Bering.

This strongly marked species can be readily distinguished by its peculiar coloration, the greatly thickened naked skin which partially conceals the short nasal and opecular spines, and the numerous tentacles surmounting the warty tubercles on crown and occiput. The fins may be uniformly black with a narrow white tip to the soft rays, or may be more or less variegated with white. On the soft dorsal, these marks are in the form of white spots which may become confluent to form 1 or 2 streaks. In some specimens, the caudal membranes are white in their middle portion the rays remaining black. The under side of head and the maxillary membranes are sometimes marked with large blackish spots with ill-defined edges.

In addition to the minute pores which lie at intervals along the course of the lateral line, the latter gives off pairs of lateral branches, each of which opens in 3 or more small pores. The sides of the head are also thickly studded with pores. Owing to the thickened integument, the pectorals and ventrals are more largely adnate to the body than in other species. The fin rays are as follows, in 10 specimens:

	First dorsal.		Second dorsal.			Anal.		Pectoral.	
Rays	IX.	X.	15.	16.	17.	11.	12.	16.	17.
Specimens ..	6	4	1	8	1	3	7	2	8

(*niger*, black.)

? *Cottus mertensii*,* CUVIER & VALENCIENNES, Hist. Nat. Poiss., VIII, 496, 1831, Petropaulski; on a drawing by MERTENS.

Cottus niger, BEAN, Proc. U. S. Nat. Mus., IV, 1881, 151, St. Paul Island, Pribilof Island (Coll. H. W. Elliott); JORDAN & GILBERT, Synopsis, 707, 1883.

Myoxocephalus niger, JORDAN & GILBERT, Rept. Fur Seal Invest., 1898.

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* *Cottus mertensii*, is thus described: Il se rapproche du petit chaboisseau de Groënland par le nombre de rayons de l'anale; mais par ceux des dorsales il est plus voisin du *Cottus octo-decim-spinosus*, et il a les épines de la première dorsale tout aussi fortes. Voici les nombres comptés par le naturaliste russe. D. 8, 15; A. 12; C. 10; P. 18, etc. La tête paraît lisse; sans épines près des narines. La pointe du préopercule n'atteint pas l'angle de l'opercule. Les couleurs indiquées sur le dessin qui nous a été communiqué par M. de Mertens, étaient de grandes marbrures de bistre foncé sur un fond jaunâtre. Ce dessin représente un individu long de huit pouces.

732. MEGALOCOTTUS, Gill.

Megalocottus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 166 (*platycephalus*).

This genus includes large sculpins, with broad flat heads, differing from *Myoxocephalus* chiefly in the sharply projecting lower jaw; the preopercle has 3 spines, the upper short and straight, the lowermost turned downward; dentation as in *Myoxocephalus*; suprascapula with 2 spinous projections; top of head warty; sides with rounded tubercles in the adult; lateral line of separated pores; a large pore behind last gill. North Pacific. (*μέγας*, great; *κόττος*, cottus.)

a. Interorbital space moderate, about equal to eye in adult; ventrals reaching anal papilla. PLATYCEPHALUS, 2359.

aa. Interorbital space very broad, 1⅗ diameter of eye in adult; ventrals not reaching vent. LATICEPS, 2360.

2359. MEGALOCOTTUS PLATYCEPHALUS (Pallas).

Head 3. D. VIII, 13; A, 12; V. I, 3; P. 16 or 17; lateral line 40. Lower jaw somewhat longer than upper; eye 5 in head, as long as snout; nasal spines distinct; orbital rim moderately prominent; a low ridge behind it toward the occiput, without spines or points. Top of head between these ridges forming a quadrangular depression, as broad as the eye in front, but narrower behind. Top of head covered with naked, warty skin. Preopercle with 4 spines, the upper as long as eye, directed upward and backward, the second much shorter, the others directed downward. Opercle with a long forked ridge, ending in 2 short diverging spines; a spine directed downward on subopercle; two sharp spines on scapular region, the lower the longer and touching the first tube of the lateral line. Lateral line complete, above, it numerous rounded bony plates armed with spinules as in *M. laticeps;* these in 2 rows anteriorly and 1 posteriorly; a few similar plates below lateral line. Fins all high, the soft dorsal especially so. Color dark, with many dark shades and spots on throat and belly, especially on gill membranes; sides and belly (in males) with irregular, round white spots; first dorsal with round pale spots, the membranes otherwise largely dusky; soft dorsal with 3 or 4 dark oblique cross shades, between which are rows of pale spots; anal with 4 dark oblique cross shades; caudal with 3 narrower dark stripes; pectoral with 4; ventrals dusky with pale spots. Okhotsk Sea and western part of Bering Sea. This description (after Kner) from a single specimen, 7½ inches long, from Decastris Bay, near the mouth of the Amur. The species is close to *M. laticeps,* which has been recorded from Alaska as *Cottus tæniopterus,* but the 2 species are different, and the type of *M. platycephalus* has the narrower interorbital space of *M. tæniopterus.* So far as known *M. laticeps* is found on the eastern shores of Bering Sea, and *M. platycephalus* on the western. Dr. Hilgendorf has, at our request, reexamined Pallas's type of *platycephalus,* a specimen a foot long. He notes: Lower jaw projecting; fin rays not easily counted, the skin being dried and varnished. D. VIII–14; A. 11. A sketch of the head shows the armature of *M. laticeps,* but the eyes closer together, 1 diameter apart. There is a blunt tubercle behind each eye and 1 at the occiput; the spine on the suprascapula is forked, and the lower fork is twice the length of the other. The upper preopercular spine is about ½ longer than the second. (*πλατυς*, broad; *κεφαλή*, head.)

Cottus platycephalus,* PALLAS, Zoogr. Rosso-Asiat., III, 135, 1811, Kamchatka; after STELLER; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 177, 1829.

Cottus tæniopterus, KNER, Sitzber Ak. Wiss. Wien, LVIII, 1868, 18, Taf. 14, fig. 10, Decastris Bay, near mouth of Amur River. (No. 5574, Mus. Wien.)

Megalocottus platycephalus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 166.

2360. **MEGALOCOTTUS LATICEPS** (Gilbert).

This species differs from *M. platycephalus* (*tæniopterus*, as shown in Kner's figure) in the following respects: The interorbital width is greater, 1¾ times the diameter of the eye in *laticeps*, equaling the eye in *platycephalus*. Similarly the distance between the anterior ends of occipital ridges is 1⅔ times diameter of eye in *laticeps*, equal to eye in *platycephalus*. Conspicuous supraorbital and occipital tubercles in *laticeps*, each surmounted by a fleshy filament; in *platycephalus* "crown and occiput are without prominences or spines, covered only with naked warty skin." In *laticeps* the preopercle has 2 diverging spines, a single downwardly directed spine below them. In *platycephalus* are 2 downwardly directed spines below the angle. The ventrals are much shorter, not reaching vent when depressed, while in *platycephalus* they reach the anal palillæ. The dorsals are also much lower in *laticeps*. The principal features of this species are the very broad flat head, short wide snout, projecting lower jaw, the 2 pairs of cephalic tubercles provided with tubercles, the verrucose head, the very short preopercular spines, the large pore behind the last gill, the presence of circular spinous plates above the lateral line and prickles below it. Head and anterior part of body broad, depressed, the depth of head, at occiput, 1⅔ in its greatest width, its length 2¾ in body. Body tapering to a slender caudal peduncle, whose least height is equal to diameter of eye. Depth of body 4 to 4⅔ in length. Interorbital space very wide, shallowly concave, its width 1¼ times diameter of orbit, and 4 to 4½ in head. The low supraocular ridge ends in a blunt tubercle above hinder margin of eye which grows higher with age, depressed, bounded by 2 low ridges which converge very strongly toward the nape, where they curve out again in low rounded tubercles; the inclosed depressed area is twice as wide anteriorly as it is at the narrowest posterior part. A strong temporal ridge, less distinct in young specimens. Nasal spines very small. Mouth wide, transverse, oblique, the maxillary reaching vertical from hinder edge of pupil, 2⅓ in head; mandible with its triangular tip protruding well beyond upper jaw in adults, the jaws nearly equal in young; length of snout equal to interorbital width. Bands of short cardiform teeth on the jaws, and a broad patch on vomer; none on palatines. A conspicuous pore behind last gill. Gill membranes almost wholly joined to the isthmus, the free border scarcely noticeable, its width less than ⅓ diameter of the small pupil. Eye small, shorter than snout, 5½ to 6½ in head. Preopercle with 2 short strong spines diverging backward, and a strong concealed point below directed downward and forward; upper preopercular spine about equal to eye, but little longer than the lower and reaching ⅓ the distance from its base to the tip of the opercular flap; opercle with a well-marked longitudinal rib ending in a sharp point; scapular and subopercular spines present. Entire top and sides of head, nape, and anterior dorsal region covered with small dermal warts; supraorbital and occipital tubercles with short filaments. Space above the lateral line with an irregular series or double series of large round spinous tubercles; a few scattered plates on sides below the lateral line; axil smooth; plates of lateral line concealed in skin. Spinous dorsal low, its longest spine 1½ in second dorsal and 3 in head. In some specimens a single line of small sharp tubercles, resembling spines, extends each side of the rays of the second dorsal. The 2 dorsals are separated by a narrow space; pectorals large, reaching front of anal, the lower rays much thickened; caudal rounded; ventrals reaching ⅔ distance to vent. Dorsal IX, 14; anal 13; pectoral 18; ventral I, 3; lateral line 36 to 40. Color dark olive brown above, with faint traces of blackish bars; sides spotted or marbeled with whitish; belly and lower parts generally white; a blackish blotch on cheeks, 1 on opercle, and a third on front of mandible; pectoral rays dusky, the membrane whitish, the fins crossed by 3 or 4 wavy black bars, which sometimes join, inclosing oblong or roundish white areas; spinous dorsal not banded, the dusky and translucent areas variously arranged; soft dorsal with 5 oblique broad dusky bars; anal with 4 bars sometimes uniting to inclose white spots; caudal similar to pectoral and anal; brilliantly colored males are largely black on sides and below, with many large, rounded, partially confluent pearly white spots. Length 6 to 11 inches. (Gilbert.) East shore of Bering Sea; known from 13 specimens from the Nushagak River, near its mouth; 1 from Herendeen Bay on the northern side of the Alaskan Peninsula and from Port Clarence (Scofield[*]). (*latus*, broad; *-ceps*, head.)

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* The following is the substance of Pallas's account of *Cottus platycephalus*. D. VII-12; A. 11; C. 10; P. 15; V. I, 3. Head large, much depressed, as though crushed, as broad as body. Tail slender; mouth large, lower jaw projecting; teeth on vomer, none on palatines. Belly much inflated. Nostrils tubular. Eyes moderate, near together; vertex flat behind the eyes, with a ridge on each side, in front of which, near the orbit, is a bony tubercle; behind at the nape, oblong tubercles, each ending in a short spine; preopercle with 2 very strong, diverging spines above; opercle with a concealed spine; lateral line with concealed, elongate plates; between it and the dorsal some round very rough warts, smaller ones below; pectorals large; dorsal spines feeble. Olivaceous, much variegated with greenish lines on sides of body below; spots large below the tail; dorsals translucent, varied with brown; caudal yellowish with faint bands; pectorals and anal banded. Length 12 inches. Kamchatka. (Pallas.) The type in the museum at Berlin has no teeth on the palatines. The generic name *Megalocottus* was originally based on the supposed presence of palatine teeth, a fallacious character. The character of the projecting chin has, however, generic value. Pallas says: "In arca lunata palatio medii et utrinque lineari," which, if we translate it correctly, is not true.

Cottus tæniopterus, BEAN, Proc. U. S. Nat. Mus. 1881, 248; BEAN, in TURNER'S Nat. Hist. Alaska, 94, pl. 6, 1886; not of KNER.

Acanthocottus laticeps, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 422, pls. 26 and 27, Nushagak River and Herendeen Bay, Alaska. (Coll. *Albatross.*)

Megalocottus laticeps, SCOFIELD, in Jordan & Gilbert, Rept. Fur Seal Invest. 1898.

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[*] Mr. Scofield observes: "We took 4 specimens of this species at Port Clarence. They differ from the types slightly in coloration. Our specimens are dark, almost black; below the anterior portion of the second dorsal is a darker saddle-like marking on the body; the caudal is black at the base and has an undulating dark band on its posterior third; the pectorals vary, being either banded or mottled. (One specimen has distinct bands on 1 pectoral while the others are simply mottled with black.) There is no slit behind last gill arch."

733. ZESTICELUS, Jordan & Everman.

Zesticelus, JORDAN & EVERMANN, Check-List Fishes, 443, 1896 (*profundorum*).

Deep-sea sculpins, closely allied to *Porocottus*, but with the skeleton little developed, the head soft and spongy, filled with mucous channels, the skin perfectly smooth, the lateral line reduced to a series of separate open pores, the vertical fins few-rayed and weak. Preopercular spine slender, curved upward. Deep seas; 2 species known; probably degraded from *Porocottus*, the soft skeleton and feeble structure being results of deep-sea life. (ζεστός, soft-boiled, *Icelus*, a son of the god of sleep.)

a. Dorsal rays VI or VII, 10 to 13; anal rays 8 to 11; pectoral 20; upper preopercular spine usually not reaching opercular margin. PROFUNDORUM, 2361.

2361. ZESTICELUS PROFUNDORUM (Gilbert).

Head 2⅔; depth 5. D. VI or VII, 10 to 13; A. 8 to 11; pectoral 20; ventral I, 3; lateral line with 17 pores. From above the head appears smooth and evenly rounded, without projecting spines or ridges. The occipital depression is very shallow, the occipital ridges depressed, scarcely noticeable, ending in depressed spines, which are made out with difficulty. Nasal spines undeveloped, the nasal bone small, posteriorly pointed, but not furnished with a projecting spine. Upper preopercular spine strongly compressed, curved upward, not reaching opercular margin, its length equaling diameter of eye; no spine at its base in front; below it 2 short, strong spines directed downward and backward, and 1 more slender downward and forward; opercle with a longitudinal rib ending in a short spinous point; a short spine on angle of opercle, and 1 below it on interopercle. Mucous canals everywhere greatly enlarged, giving a spongy texture to the entire head; series of very conspicuous pores on the preopercle, the mandible, and below suborbital chain. Mouth broad, oblique, the maxillary reaching middle of pupil, 2⅓ in head; mandible slightly protruding. Minute teeth in upper jaw, anteriorly in 2 rather distinct rows, laterally in narrow bands; teeth on vomer, none on palatines. Eye longer than snout, 3¾ to 4 in head. Interorbital width ½ diameter of orbit. Gill membranes widely joined, with a wide free posterior edge; no slit nor pore behind last gill. Body smooth, without plates, granulations, or filaments; no plates developed in connection with the lateral line; pores of lateral line in a double series, the 2 closely approximated, those of the lower series much the larger; no evident tubercles by which these communicate with the main canal. Longest rays of second dorsal ½ length of head, twice the longest dorsal spine; pectoral reaching front of anal or slightly beyond; ventrals short, not nearly reaching vent. Upper parts very light brownish, the belly and sides below lateral line dark brown; fins blackish; mouth and gill cavity dark. A deep-sea form, characterized by the obsolescence of the occipital and nasal spines, the absence of the accessory spine in advance of upper preopercular spine, and in the more numerous rays of dorsal and anal fins. Length about 2 inches. Bering Sea in deep water, 4 specimens known; from off Unalaska in 399 fathoms, and north of Bogoslof Island at *Albatross* Station 3634, in 664 fathoms, where a single specimen 58 mm. was obtained. This specimen closely resembles the type of *Zesticelus profundorum*, but the spines are somewhat stronger than in the latter and the fins shorter. In the Bogoslof specimen the upper preopercular spine extends to margin of opercle, and the occipital spines are more evident, terminating in short strong ridges. D. VII, 10; A. 8; P. 20. The lower parts, up to and including the lateral line, are blackish, the line separating them from the lighter under parts very sharply defined. Fins all black. Otherwise essentially as in the type of *Z. profundorum*, with which we now consider it identical. The variation in the fin rays in this species is considerable, if the figures given by Dr. Gilbert are correct. One of the cotypes, however, has P. 20, not 17 or 18, as stated by Gilbert. The figure also shows 20 rays in the pectoral. It also shows 11 rays in the anal, while our specimen has but 8. (*profundorum*, of the depths.)

Acanthocottus profundorum, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 423, pl. 26, Bering Sea north of Unalaska Island at Albatross Station 3329, in 399 fathoms.
Zesticelus profundorum, JORDAN & GILBERT, Rept. Fur Seal Investigations, 1898.

734. DASYCOTTUS, Bean.

Dasycottus, BEAN, Proc. U. S. Nat. Mus. 1890, 42 (*setiger*).

Head large, with large, bony tubercles and numerous filaments. Mouth wide, jaws equal, or lower jaw slightly projecting. Teeth minute, in villiform bands in jaws; vomerine teeth in 2 patches, separated by an interspace; palate toothless. Preopercle with 2 spines at its angle and 2 rudimentary ones on each edge of its lower limb. Gills 3½, no slit behind the last; gill rakers short, tubercular, in moderate number; gill membranes free from isthmus; pseudobranchiæ present. Skin smooth, except on nape and along dorsal base, where it bears a few small, bony tubercles. Spinous dorsal well developed and separated from the soft dorsal by a deep notch; pectorals moderately long, their rays procurrent below; ventrals with a spine and 3 rays; caudal rounded. North Pacific. Very close to *Cottunculus*, apparently differing in having cirri on the head and the preopercular spines not hidden by skin. (δασύς, woolly; *Cottus*.)

2362. DASYCOTTUS SETIGER, Bean.

Head 2; depth 3. D. IX, 15; A. 13; V. I, 3; lateral line (pores) 11 or 12. Eye nearly equal to snout, ⅖ length of head. Maxillary expanded behind, its length equaling that of snout and eye combined, extending to a little behind middle of eye. Pectoral extending to above anal origin; ventral ½ as long as postorbital part of head; longest dorsal spine about equaling eye in length; spinous dorsal with 2 dusky bands extending down on the sides; soft dorsal with 2 bands; a similar one at caudal base and 3 narrow bands on second half of caudal; pectoral indistinctly banded; head speckled with brown dots. (Bean.) North Pacific; the types from *Albatross* Station 2855, north latitude 57°, west longitude 153° 18′, at a depth of 69 fathoms, off Sitkalidak Island; our specimens from Puget Sound and off Karluk. Concerning this species Dr. Gilbert observes:

"Taken at *Albatross* Stations 3216, 3257, 3310, 3311, and 3334, located north and south of the Alaskan Peninsula, and north of Unalaska Island, in 50 to 85 fathoms. Tubercles on head definitely placed; 1 in front of eye; 4 above orbit, the posterior 2 the largest; a pair on middle of suborbital stay, with a smaller one above them; 1 on temporal region, and 1 on shoulder; by far the largest pair on occiput, where they are high, compressed spines, directed vertically upward, as long as diameter of pupil; nasal spines obsolete. Cirri are generally distributed over upper part of head and body, the longer ones being specially numerous on maxillary, under surface of mandible, and on the opercle and preopercle; of the larger ones, 2 often proceed from 1 base; a series of short filaments along upper edge of pupil. Mucous pores large, those of the mandibular and buccal series slit-like. In adults the dorsal bands break up into series of spots and become inconspicuous." (*seta*, bristle; *gero*, I bear.)

Dasycottus setiger, BEAN, Proc. U. S. Nat. Mus. 1890, 42, off Sitkalidak Island, Alaska (Type, No. 45370. Coll. *Albatross*); JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 810, pl. 83; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 411.

735. COTTUNCULUS, Collett.

Cottunculus, COLLETT, Norges Fiske, 20, 1875 (*microps*).

Body tadpole-shaped, the head extremely large, the body tapering rapidly from the shoulders to the slender tail; mouth rather large, terminal, oblique, the jaws about equal; villiform teeth in the jaws; a double patch on vomer; no teeth on the palatines; no spines on the head, the tubercular surface of the skull covered by skin; skull thin, its bones not firm. Gills 3½, no slit behind the last arch; gill membranes broadly joined to the isthmus, their union extending to above the lower edge of the base of the pectorals. Pseudobranchiæ very small; no cirri, scales, or prickles; the skin thin and movable, smooth, or roughened with small warts. Spinous dorsal little developed, the 2 fins usually continuous; spines very slender, flexible, embedded in the skin; pectorals short, procurrent below; ventrals very short, well separated, their rays I, 3; caudal rounded. Deeper parts of the Atlantic. (A diminutive of *Cottus*.)

a. Anal rays 10.	MICROPS, 2363.
aa. Anal rays 13.	THOMSONII, 2364.

2363. COTTUNCULUS MICROPS, Collett.

Head 2⅔; depth 3½. D. VI, 19; A. 10. Head very large, its length, breadth, and depth nearly equal; the greatest depth at the nape; 4 bony tubercles on top of head and some at the sides, all covered by the skin;

lower jaw included; maxillary extending to below the middle of the eye, which is equal to the snout, and about 4½ in head; suborbital stay and the roughish edge of the preopercle both covered by smooth skin; chin and preorbital with pores; skin everywhere thin, somewhat movable, its surface roughened by small blunt warts; dorsal fin continuous, the feeble spines lower than the soft rays; pectorals barely reaching anal; caudal long. Color pale, with 3 broad, dusky cross bands on body and fins, 1 on head, 1 through spinous dorsal and pectoral, and 1 through second dorsal and anal, besides a small band at base of caudal. Length 8 inches. Deep water off coasts of Norway and Rhode Island; taken by the United States Fish Commission in the expeditions of the *Blake, Fish Hawk*, and *Albatross.* Here described from specimens taken off Rhode Island. (*μικρός*, small; ὤψ, eye.)

Cottunculus microps, COLLETT, Norges Fiske, 20, pl. 1, figs. 1–3, 1875, Hasvig, near Hammerfest, Norway, in 200 fathoms (Coll. Prof. G. P. Sars); COLLETT, Meddelelser om Norges-Fiske, 1875–78, 1879; COLLETT, Forh. Vid. Selsk., Christiania, 1880, 11; COLLETT, Norsk. Nordh. Exped., 18, pl. 1, figs. 5, 6; Nyt. Mag. f. Naturvid., XVIII, 53, 1884; STRÖM, Norsk. Vid. Selsk. Skrift. 1880, 75; GOODE, Proc. U. S. Nat. Mus. 1880, 470; GOODE & BEAN, Bull. Mus. Comp. Zool., X, 212, 1883; LILLJEBORG, Sverig. och. Norg. Fiske, 113; JORDAN & GILBERT, Synopsis, 688, 1883; GÜNTHER, Challenger Report, XXII, 60, pl. 9, fig. A, 1887; GOODE & BEAN, Oceanic Ichth., 269, figs. 257 and 261, A, B, 1896.

2364. COTTUNCULUS THOMSONII (Günther).

Head 2½; depth 3½ to 4; eye 4½ in head; snout 4½; D. VI, 17; A. 13; P. 22; V. I, 3; C. 10. Head and body smooth, scaleless, covered with a tough, lax skin; length of head nearly ⅓ extreme length of body, including caudal, its greatest height ¼ body without caudal; greatest width of head twice length of maxillary; distance of vent from insertion of anal equals length of maxillary; eye close to dorsal profile; intermaxillary long and slender, slightly more than 3 times in distance from tip of snout to insertion of first dorsal, 3⅓ in head; maxillary very slender, except in posterior third, where it is considerably expanded; mandible very stout, posteriorly widened, its length contained nearly 2⅓ times in head. Teeth in broad, villiform bands on intermaxillary and mandible; 2 short, separate, similar bands on vomer; none on palatines. Head armed with blunt spines as in *C. microps.* Distance of dorsal from tip of snout nearly equal to ⅓ total length, caudal included; anal fin midway between tip of snout and end of caudal; length of upper pectoral rays equal to that of postorbital portion of head, its rays diminishing rapidly in size, the lowest being exceedingly short; distance of ventral from tip of snout ⅓ of total length without caudal; length of free portion of ventral equals eye. Color light brown, the fins somewhat darker. Northern Atlantic, in deep water. Length 6 inches. Specimens obtained by the *Blake* from Station 306, in 41° 32′ 50″ north latitude, 65° 55′ west longitude, etc.; also by the *Albatross* from Station 2181, in 39° 29′ north latitude, 71° 46′ west longitude, etc., and by the *Fish Hawk* from Station 1029, in 39° 57′ 6″ north latitude, 69° 16′ west longitude, etc. (Named for Sir C. Wyville Thompson, Regius professor of Natural History in the University of Edinburgh, first Director of the

Civilian Staff on board H. M. S. *Challenger* during her magnificent scientific explorations.) (Goode & Bean.) (Eu.)

Cottus thomsonii, GÜNTHER, Proc. Royal. Soc. Edinburgh, XI, 1882, 679, Challenger Station 4.
Cottunculus torvus, GOODE, Proc. U. S. Nat. Mus., III, 1880, 479, Gulf Stream, off Rhode Island; GOODE & BEAN, Bull. Mus. Comp. Zool., X, 212, 213, 1883; JORDAN & GILBERT, Synopsis, 688, 1883.
Cottunculus thomsonii, GÜNTHER, Challenger Report, XXII, 61, pl. 9, fig. B, 1887.

736. MALACOCOTTUS, Bean.

Malacocottus, BEAN, Proc. U. S. Nat. Mus. 1890, 42 (*zonurus*).

Shape similar to that of *Cottunculus*. Body tapering rapidly to the slender tail; head large; mouth terminal; jaws subequal; minute villiform teeth in broad bands on maxillary and mandible; vomer and palate toothless; preoperculum armed with short, stout, simple spines. Bones of the skull thin. Gills 3½, no slit behind the last. Gill openings wide, the membranes broadly attached to the isthmus. Gill rakers tubercular, in moderate number. Spinous dorsal low, separated by a deep notch from the soft dorsal. Pectorals procurrent in front; ventrals small; caudal rounded; vent distant from the anal origin. Head and body naked. Lateral line consisting of a series of large pores. North Pacific. (*μαλακός*, soft; *Cottus*.)

2365. MALACOCOTTUS ZONURUS, Bean.

Eye 3½; snout 3½; depth equaling length of head without snout. D. IX, 14; A. 11; V. I, 3; lateral line (pores) about 14. Interorbital spaces less than ½ length of eye. Maxillary extending to below middle of eye. Pectoral reaching to a vertical through the anal origin or a little beyond; ventral scarcely as long as eye; spinous dorsal low, its base ½ as long as head, its longest spine ⅔ as long as eye; origin of dorsal immediately above upper angle of gill opening; least height of tail scarcely ⅔ length of eye; four spines on preopercle, the largest less than ½ as long as eye and with a supplementary spine at its base. A dark-brown saddle-shaped band over the end of spinous dorsal and 2 on soft dorsal; a brown band at base of tail and 3 on caudal; pectoral with several indistinct dark bands intermingled with pale areas; tips of pectorals in their lower half milky white. Length 4¾ inches. Coasts of Alaska, about the peninsula. Concerning this species Dr. Gilbert observes:

> Several specimens were taken north of Unalaska Island and south of Unimak Island, in 138 and 351 fathoms. Nasal spines obsolete; supraorbital rim low, slightly elevated in front but not behind, the interorbital space wide, shallowly concave. Occiput with 2 blunt conical protuberances in lieu of ridges, and without spines; a slight occipital depression; preopercular angle with 3 radiating spines of nearly equal length, a smaller spine directed outward in advance of the middle one of the 3; below these a partially concealed spine directed downward and forward. Opercular rib very strong, sharp anteriorly, broadening behind and provided with 3 low ridges, not ending in a definite spine; a spinous point on subopercle and 1 on interopercle; none on shoulder. Anterior nasal tube short, the posterior margin prolonged into a laciniate flap; head well provided with slender cutaneous filaments, 3 on upper portion of eyeball, 4 in a transverse line behind

occiput, a very long one on opercular angle, and numerous shorter ones on opercle, jaws, and along anterior portion of lateral line. Branchiostegals 7. Body without plates or prickles; the head, including upper part of eye, and the upper anterior part of body, with sparsely distributed stellate granulations, visible only in large specimens. In our specimens the brown bar at base of caudal is followed by a wide white bar, sometimes more or less broken, the terminal half blackish, narrowly margined with white.

(*ζώνη*, band; *οὐρά*, tail.)

Malacocottus zonurus, BEAN, Proc. U. S. Nat. Mus. 1890, 43, off Trinity Islands, Alaska, at Albatross Station 2853, at 56° N., 154° W., in 159 fathoms (Type, No. 44643. Coll. *Albatross*); GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 411.

737. ARGYROCOTTUS, Herzenstein.

Argyrocottus, HERZENSTEIN, Mélanges Biol. Ac. Imp. Sci., XIII, 1892, 219, St. Petersburg.

Spinous dorsal short; ventrals extremely long, their tips extending beyond front of anal fin; gill membranes scarcely united to the isthmus, forming a broad fold across it, no slit behind the last gill; teeth on the vomer, none on the palatines; skin entirely naked, without scales or bony plates; preopercles with 3 small spines. North Pacific. (*ἄργυρος*, silver; *Cottus*.)

2366. ARGYROCOTTUS ZANDERI, Herzenstein.

Head $3\frac{1}{5}$; depth $4\frac{5}{6}$. C. VIII–15; A. 13; P. 14; V. 3; C. 18; lateral line with 35 tubes. Eye $3\frac{5}{9}$ in length of head; interorbital space $1\frac{5}{9}$ in eye; 2 well-developed crests at the vertex; maxillary reaching middle of eye; lower jaw slightly projecting; 2 anal spines; 3 small spines on preopercle, the upper half as long as the eye, turned upward, the others directed downward; longest dorsal spine $\frac{1}{2}$ length of head; pectoral reaching ninth ray of soft dorsal; ventrals reaching to the next to the last ray of anal. Color brownish, dark above, with numerous silvery spots bordered with darker, a silvery stripe from below the eye to the base of the lower jaw; another from eye to angle of preopercle; a row of 6 large irregular spots along middle of sides, many smaller ones below these; 2 smaller irregular spots behind these; a bell-shaped spot with a point directed upward on the belly between the ventrals; the first dorsal with its upper margin blackish, with milk-white spots dotted with black; a transparent spot at base of fourth and sixth rays; a small transparent spot near base of fourth ray; another behind sixth; about these spots the coloration is darker; soft dorsal almost uniformly dark; anal colorless, its border dark, with 2 or 3 dark spots on each ray; caudal uniformly dusky, the upper and lower rays blackish, with clear spots; ventral with darker cross streaks; pectorals with dark rings and streaks. Ventral in female probably much shorter than in male, the color less marked. Three specimens of this beautifully marked Cottoid taken in Shana Bay, Iturup Island, show the following characters: The branchiostegal membranes are widely joined across the throat, narrowly united in front of the middle line of isthmus, with a rather wide free margin behind; lateral line without plates; nasal spines small; 4 short spines on preopercular margin. These specimens answer well to the detailed description of the type, but are still more ornate, in that they possess along the back a number of broad dark bars alternating with lighter bars, the former confluent below, with the ground color of the sides. In the largest specimen, 7 cm. long, the ventral fins extend only to base of third anal ray. There are no tubercles on the rays, and the membranes extend nearly to tips of the 2 outer rays, and $\frac{2}{3}$ length of the inner ray. The ventral spine is slender, nearly as long as the inner ray, and is firmly adnate to outer ray. The smaller specimens are, respectively, 4 cm. and 3.5 cm. long, the ventrals reaching in one to front of anal, in the other to vent; fins are finely cross barred, more variegated than in the type. Known only from Saghalien Island, 1 specimen 92 mm. long (Herzenstein), and Iturup Island, where 3 specimens were obtained by the *Albatross* in 1896, our description from the latter. (Named for its discoverer, Dr. Zander.)

Argyrocottus zanderi, HERZENSTEIN, Mélanges Biol. Ac. Imp. Sci., XIII, 1892, 219, Korsakow, Saghalien. (Type, No. 9679, Mus. St. Petersburg. Coll. Dr. Zander.)

738. POROCOTTUS, Gill.

Porocottus, GILL, Proc. Ac. Nat. Sci. Phila. 1859, 166 (*quadrifilis*).

This genus contains small sculpins, distinguished from *Myoxocephalus* by the presence of 4 spines on the opercle, the uppermost being curved or hooked upward. Lower jaw included; 1 suprascapular spine; lateral line modified, giving off pairs of diverging branches, with pores at their ends. Cirri above eye and on nape. Northern Pacific; the species not well known and possibly reducible to 1 or 2. (πόρος, pore; κόττος, *Cottus*.)

- *a*. Dorsal rays VIII, 13 or 14; anal rays 11 or 12.
  - *b*. Opercle with 3 ridges, the upper ending in a sharp spine; pores of lower jaw small; fins low. SELLARIS, 2367.
  - *bb*. Opercular spines well developed; fins high; pores well developed. QUADRATUS, 2368.
  - *bbb*. Opercle undescribed. POLARIS, 2369.
  - *bbbb*. Opercle without rib or spine. QUADRIFILIS, 2370.
- *aa*. Dorsal rays VI, 16; anal rays 14; lower jaw with large pores; opercular spines obsolete. TENTACULATUS, 2371.

2367. POROCOTTUS SELLARIS (Gilbert).

Head $2\frac{4}{5}$ to 3 in length; depth $3\frac{3}{5}$. D. VIII, 14 (13); A. 10 to 12 (usually 11); P. 16. Pairs of pores in lateral line 32 to 34. Branchiostegals 6. Head cuboid, the anterior profile of snout subvertical, the greatest width a trifle more than the depth at occiput. Cheeks subvertical. Interorbital region elevated, the supraorbital rim furnished posteriorly with a low tubercle which usually bears an inconspicuous cirrus. The interorbital space is rather wide, transversly concave, its least width $2\frac{1}{5}$ in eye. Occipital depression well marked, the ridges unbroken, straight, converging rapidly backward, the distance between their tips but $\frac{2}{3}$ that between their anterior ends. From the latter, 2 low ridges converge for a short distance onto the floor of occipital depression. The ridges do not terminate in spines, but bear small cirri similar to those above eye. Like the latter, they may be indistinct or wanting. Maxillary reaching vertical from posterior margin of pupil, 2⅗ in head; eye 3⅔, slightly exceeding snout. Nasal spines very strong. Two short spines diverge from angle of preopercle, the upper one slightly curved, directed upward and backward, ½ the diameter of orbit, the lower directed straight backward, ⅖ the length of the upper one. Below these a short spinous projection concealed in the skin, and a longer spine directed downward and forward; opercle with 3 lengthwise ridges, the uppermost ending in a definite sharp spine; subopercular spine well developed; 1 also at posterior end of interopercle, and 1 at shoulder. Gill membranes broadly joined to isthmus, with a wide free fold posteriorly; a few small prickly plates behind axil of pectorals; skin otherwise smooth; occiput and nape thickly covered with minute dermal papillæ, interspersed with very small mucous pores, which are distributed also over the anterior part of the head; pores on mandible and preopercular margin small, not better developed than in other species of *Porocottus*. Lateral line giving off pairs of short diverging branches, at the tips of which are the pores. Dorsals connected at extreme base; soft dorsal terminating slightly behind the anal; fins all low; ventrals reaching vent; pectorals to opposite third ray of anal. Color in spirits: Upper parts brownish, with 2 very conspicuous white saddle-shaped bars extending downward and forward from back, the first, about as wide as orbit, extending from below the dorsal notch in a straight line toward lower axil of pectorals, including above, the posterior margin of spinous dorsal, and the extreme basal portion of first rays of soft dorsal; the second bar including dorsally the terminal portion of soft dorsal onto which it extends, and the anterior portion of caudal peduncle; like the anterior bar, it is variable in width, extending forward and downward to below caudal peduncle; the ground color becoming intensified along the margins of these light bars; caudal with a light basal bar which becomes widened and pure white in its lower half, adding ½ to the series of conspicuous light markings; in some specimens, these white bars are tinged with brownish, hence less conspicuous; under parts whitish; lips and lower jaw with light and dark cross bars, which are often indistinct; branchiostegal membranes sometimes with indistinct cross bars; the darker interspaces below soft dorsal and on caudal peduncle usually encircle the body below, but are sometimes (in males) broken on middle of sides with spots and blotches of white (see figure in Nelson's report cited below); axil of pectorals usually with 2 round white spots, most distinct in males; basal portion of anterior face of pectorals dusky or black, in males with 2 round white spots; fin distally barred with light and dark; caudal cross barred; anal and ventrals with faint cross bars, or plain; dorsal blackish. Taken abundantly in Bristol Bay, Bering Sea, and neighboring parts of the Arctic, in depths 5 to 17 fathoms. We are unable to follow Dr. Bean in identifying this fish with *Porocottus quadrifilis*, Gill (Proc. Ac. Nat. Sci. Phila. 1859, 166). The latter is described as having a single hooked preopercular spine, an opercle without rib or spine, and large pores on head and lower jaw. None of these applies to the present species. *P. quadrifilis* is also said to have 5 branchiostegal rays, but this is possibly an error. It is also described as having a slender superciliary filament, and 1 on each side of the nape. We do not find, to offset these, any details in the original description which agree strikingly with our fish, even the color being inapplicable. (Gilbert.) (*sellaris*, saddled.)

Cottus quadrifilis, BEAN, in NELSON'S Report Nat. Hist. Coll. in Alaska, 309, pl. 18, 1887; not *Porocottus quadrifilis*, GILL.

Acanthocottus sellaris, GILBERT, Report U. S. Fish Comm. 1893 (1896), 419, Bristol Bay, at Albatross Stations 3229, 3231, and others, in 5 to 17 fathoms.

2368. POROCOTTUS QUADRATUS, B. A. Bean, new species.

Head 2⅔; depth 3¾; eye 3½ in head; mandible 3½; maxillary 3; interorbital width 2 in eye. D. VIII, 14; A. 12; V. I, 3; P. 16. Head rather short and broad, quadrangular; profile from tip of upper jaw ascending and thence gently sloping upward to origin of dorsal, from which point almost vertically to end of nasal spine, rounding over orbital ridge, the body gradually tapering to the tail, the depth of the caudal peduncle being contained about 3½ times in greatest depth of body. Gill membranes united and forming a fold across the isthmus. Opercular spines well developed, the lowermost on opercle and that on preopercle being curved downward and upward. Cranial ridges ending in spines of small size. Numerous pores on head, those in front visible to the naked eye; tubular pores on body, especially above anal base, where they appear to the naked eye as raised white specks. Fins all well developed, large; length of first dorsal base little more than ½ length of second; anal fin origin under third and fourth rays of second dorsal and ending opposite its last ray; length of longest dorsal spine about ¾ as long as longest ray, or equal to length of longest anal ray; pectorals large and broad; ventrals reaching past anal origin. Color reddish brown, relieved by much white; under parts whitish; head above and below brown, flecked with white; lips pale; a broad white half bar on body extending from end of spinous dorsal to fourth ray of second dorsal, another extending from sixth to ninth ray, and a third from last ray to near end of caudal peduncle, which it encircles in connection with a dark bar, the latter extending on the caudal fin; pectorals and caudal barred; ventrals with round black blotches forming rows on the rays. Bering Island; only the type known. (B. A. Bean.) (Type, No. 33875, U. S. Nat. Mus., a single example 3 inches long, Bering Island, 1883; collected by Dr. L. Stejneger.) (*quadratus*, four-angled.)

Porocottus quadratus, B. A. BEAN MS., in JORDAN & GILBERT, Rept. Fur Seal Investigations, 1898, Bering Island.

2369. POROCOTTUS POLARIS (Sabine).

This very imperfectly described species is no doubt allied to *Porocottus sellaris* and *quadrifilis*. It is thus characterized: D. VI, 13; P. 15; V. 5; A. 14; C. 14 (Sabine). D. VIII, 13; P. 15; V. 5; A. 15; C. 12 to 14 (Ross). This species is compared by Captain Sabine to *Cottus gobio*, but that has the head almost unarmed. It agrees with *Cottus* (*Enophrys*) *claviger* in the number of rays in the dorsal, but its ventrals are described as having more rays than usual in this genus. Capt. J. C. Ross informs us that it seldom exceeds 2 inches in length, and that it is very abundant on the east side of the peninsula of Boothia, affording a plentiful supply of food to the numerous waterfowl which breed there. "A species of *Cottus*, similar in habits to *C. gobio*, very adundant on the shores of north Georgia (lat. 75°), inhabiting the pools of water left by the tide, and the mouths of small rivulets by which the snow on melting found its way to the sea; the largest individual did not equal 2 inches in length; the head is more compressed and not so much flattened as in the *Cottus quadricornis*, and is armed with 2 strong spines placed before and between the eyes; the gill covers are also armed with 4 strong spines; the pectoral fins are larger in proportion than those of *C. gobio*, and the upper jaw rather exceeds the lower; the lateral lines are furnished with a series of small tubercles directed backward; color light, with clusters of minute dusky spots." (Richardson; quoted from Sabine.) Not recognized by recent writers. Lütken compares it with *Icelus bicornis*, but it must be different, and it may be identical with *Porocottus quadrifilis;* it is at least a *Porocottus.* (*polaris*, polar.)

Cottus polaris, SABINE, App. Parry's First Voyage, CCXIII, north Georgia; J. C. ROSS, App. LIII; RICHARDSON, Fauna Boreali-Americana, III, 43, 1836; JORDAN & GILBERT, Synopsis, 706.

2370. POROCOTTUS QUADRIFILIS, Gill.

This species is known only from Dr. Gill's account, as follows:

"D. VIII, 13. The color is purple, irregularly spotted with black. There is a dark spot under the eye, and another on the maxillary. The dorsals, caudal, and pectorals are irregularly variegated with black. On the pectorals there is a dark spot at the upper axilla, and another larger one toward the middle of the base. There is a slender superciliary filament and 1 on each side of the nape. It is to the presence of these that the specific name is designed to draw attention. Specimens were obtained in Bering Straits at the same time as *Boreocottus axillaris*, Gill."

The genus *Porocottus*, Gill, is thus described:

"Body anteriorly subcylindrical, rapidly declining to the caudal. Skin naked. Lateral line opening by pores in raised papillæ, under a cutaneous keel. Head large and depressed, subrhomboidal. Nasal spines small. Preopercle with a single hooked spine. Opercle without a longitudinal rib or spine. Large pores under the lower jaw and on various parts of the head. Mouth moderate. Teeth on the jaws and front of the vomer. Branchiostegal membrane continuous under the throat, but attached along the middle to the throat, almost as far as the margin. Branchiostegal rays 5. Dorsals separate; the first low, the second oblong and opposite the anal. Ventrals small, behind the pectorals, each with a spine and 3 soft rays. The *Porocotti* have a strong resemblance to the *Boreocotti*, but are distinguished by the naked skin, hooked preopercular spine, the absence of a longitudinal rib on the opercle, numerous pores, and the presence of only 5 branchiostegal rays. (Gill.)"

Not recognized by recent collectors. (*quatuor*, four; *filum*, filament.)

Porocottus quadrifilis, GILL, Proc. Ac. Nat. Sci. Phila., 1859, 166, Bering Straits.
Cottus quadrifilis, JORDAN & GILBERT, Synopsis, 708, 1883.

2371. POROCOTTUS TENTACULATUS (Kner).

Head 3½. D. VI-16 or 17; A. 14 or 15; V. I, 13, P. 14 or 15. Head small, mouth small, the lower jaw included; eye large, 3 in head, longer than snout; interorbital space channel-like, less than ½ diameter of eye; a sharp spine before each eye, on which is a fringed tentacle; supraocular ridge ending in a blunt, forked, bony knob, on which is a small thread-like tentacle; the quadrangular interspace between these two sets of tentacles is excavated; preopercular spine long, curved upwards, ⅔ diameter of eye; the second spine much shorter and turned backward; 2 spines lower, turned downward; subopercle with a spine turned downward; a similar one on opercle; maxillary reaching to middle of eye; lower jaw with large pores. Dorsal fins low, the rays flexible, the two close together; ventrals reaching vent; pectorals past beginning of anal. Skin of body wholly naked; lateral line complete, bending downward on caudal peduncle. Color clear brown, darker above, the head above with a few large dark brown spots, which form obscure bands, 1 of these from front of eye across upper lip, second broader from eye across subopercle; lower jaw speckled; throat and breast plain yellowish; back with about 6 dark cross bands, those most anterior the broadest; sides of body with a network of brown streaks around pale spots; a large bright yellow spot at base of caudal; fins all finely spotted with whitish and dotted with dark, the caudal with 5 or 6 dark cross bands; pectorals faintly barred (Kner.) A single specimen, 2 inches long, said to be from Singapore, which is of course an error. It probably came from the Pacific coast of Asia, perhaps from Yezo or Decastris Bay. As Kner has indicated, this species has much in common with *Porocottus quadrifilis*, but the fin rays are more numerous. It is, however, not impossible that the two are identical and both may be identical with *P. sellaris* and *P. polaris*. (*tentaculatus*, bearing tentacles.)

Cottus tentaculatus, KNER, Sitzber. Akad. Wiss. Wien, LVIII, 1868, 22, taf. 5, fig. 12, Singapore; evidently an error. (No. 5591a Wien Mus.)

739. ONCOCOTTUS, Gill.

Oncocottus, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 13 (*quadricornis*).

This genus contains small sculpins allied to *Myoxocephalus*, but with 4 preopercular spines, the uppermost being straight; a rather large slit behind the last gill arch; the lateral line chain-like in form. Mouth small, the lower jaw included, the dentition as in *Myoxocephalus*. Isthmus narrow, the gill membranes forming a broad fold across it, males with rough stellate tubercles and with the crest on top of head rough and formed like the comb of a cock, these little developed in the female. Bones of head somewhat cavernous, but less so than in *Triglopsis,* from which genus *Oncocottus* is scarcely distinct. Species circumpolar, probably reducible to one. (*ὄγκος,* hook; *κόττος, Cottus.*)

a. Atlantic species; maxillary short; pectoral moderate; caudal rounded. QUADRICORNIS, 2372.

aa. Arctic American species; maxillary longer; pectoral longer; caudal truncate. HEXACORNIS, 2373.

2372. ONCOCOTTUS QUADRICORNIS (Linnæus).

Head $3\frac{1}{4}$; depth 4; eye 4 in head. D. VIII or IX–14; A. 13 or 14; cæca 7; vertebræ 40; lateral line 45. Body rather slender, the caudal peduncle very slender. Head long, tapering forward; mouth large, the maxillary reaching to below posterior margin of eye; lower jaw included; bones of head below eye cavernous, as in *Triglopsis thompsoni,* but less so; preopercle with 2 long, diverging spines, the upper and longer not quite reaching opercular margin; opercular and scapular spines quite short; adult male with a rugose spine, broader and expanded at tip like a cock's comb above each eye posteriorly, and a similar one on each side of occiput; these spines smaller in the female and the young. Males with irregular series of round, rough, wart-like scales above the lateral line, these wanting in the female; lateral line chain-like, with small embedded plates; head naked. First dorsal convex, of slender spines, well separated from second, which is rather high, the longest ray $1\frac{3}{5}$ in head; pectorals reaching anal; ventrals moderate; caudal rounded. A moderate slit behind last gill. Color little variegated; olivaceous above; the fins faintly spotted. Arctic regions, south to the Baltic Sea, westward to eastern Greenland. If it is identical with *O. hexacornis,* its range extends westward to Siberia, and its distribution is circumpolar. It is abundant in the eastern Baltic and in Lakes Ladoga and Onega where it is dwarfish in size, without the horns on front and nape;* north to the White Sea and Nova Zembla. It is said to be rare in England and eastern Greenland; unknown in western Greenland. Dr Lütken has compared specimens from eastern Greenland with others from the Baltic and finds no difference except that the interorbital space in European examples is more concave. *O. hexacornis* is found in the waters of Arctic America and may not be different. (*quatuor,* four; *cornu,* horn).

Cottus quadricornis, LINNÆUS, Syst. Nat., Ed. x, 264, 1758, Baltic Sea; GÜNTHER, Cat., II, 166, 1860; LÜTKEN, Vid. Med. Kjöb., 87, 1876; DAY, Fish. Great Brit., 53, 1880; JORDAN & GILBERT, Synopsis, 705, 1883.

Oncocottus quadricornis, GILL, Proc. Ac. Nat. Sci. Phila. 1862, 13.

? *Acanthocottus labradoricus,* GIRARD, Bost. Journ. Nat. Hist., VI, 1850, 247 pl. 7. fig. 3., coast of Labrador; female.

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* These dwarf specimens may not be separable from *Triglopsis,* which genus is evidently derived from the lacustrine degradation of *Oncocottus.*

2373. ONCOCOTTUS HEXACORNIS (Richardson).

D. VIII or IX, 14 or 15; A. 14 or 15; P. 17; V. I, 3; Br. 6. Head $3\frac{1}{5}$ (to end of opercular spine); eye 5; snout $3\frac{1}{2}$; interorbital space $6\frac{1}{2}$; maxillary 2. Body slender, tapering gradually from the rather narrow depressed head to a very slender caudal peduncle; mouth large and horizontal; the maxillary reaching past the orbit; lower jaw shorter than the upper but not quite included within it. The spine on the head smooth and without tubercles or warts. In place of the supraocular and occipital spines there are 4 large bony elevations, each much resembling the comb of a cock, their upper surfaces rough and scabrous. (In the young these 4 big bones are very small or warty.) The occipital ridges scarcely elevated and inclosing an oblong and slightly concave area narrowest posteriorly and running into the concave interorbital space anteriorly; nasal spines well developed and in the older fish inclined to be club-shaped and scabrous; upper angle of the superclavicle prolonged posteriorly into a strong spine, its upper surface scabrous; just at the base and immediately in front of it a much smaller spine or tubercle on the posterior end of the post-temporal bone; a spine almost concealed in membrane just above base of pectoral; preopercle with 4 spines, the upper equaling the orbit in length and extending upward and backward, in some curved slightly inward, covered with membrane for about $\frac{1}{2}$ its length; the second spine immediately at the base of the first and is $\frac{1}{2}$ as long, straight, and extending outward and backward; the third, found farther down, curved downward; the fourth, at the lower angle of the preopercle, directed forward and downward and sometimes entirely covered by membrane; opercular spine rather strong, its point raised from the membrane and not reaching end of opercular flap. There is a slender sharp spine at the lower angle of the opercle, lateral line running rather high and composed of elongated rectangular plates, each with a concave depression at either end, thus making a row of elliptical depressions along the lateral line; the plates not present on the posterior half of the caudal peduncle; above the lateral line a row of rough circular osseous plates, beginning on the nape and running to the base of the caudal, gradually becoming smaller and nearer together; under the second dorsal this row is double; below the lateral line and beneath the second dorsal about 3 irregular rows of similar but smaller plates.

Adult female.—First dorsal lower than in male, scarcely rounded posteriorly but sloping almost gradually toward the base of the second dorsal; third and fourth spines longest and equal to length of snout; second dorsal about twice as high as first and varying a great deal in shape, the membrane scarcely incised, the first 3 or 4 rays with rough, prickly edges; anal oblong and slightly rounded, the middle rays longer than snout, the membrane between the rays not incised; pectoral scarcely reaching front of second dorsal, first 2 or 3 rays rough on their outer edge, the membrane not incised; caudal not rounded but truncated with rather sharp corners, 10 developed rays, 8 of them branched; ventrals reaching $\frac{2}{3}$ to the vent, the inner ray no longer than the middle one.

Adult male.—The first dorsal higher than in the female, the third and fourth rays longest and equal in length to the distance from snout to middle of eye, posterior end of fin more rounded; second dorsal more than twice as high as first, the membrane between the rays deeply incised, the anterior rays projecting for nearly ½ their length beyond the membrane, the membrane following around the edge of the projecting rays, the rays scabrous on their sides; anal oblong, but more angular than in female, the longest ray reaching from snout to posterior edge of orbit; the membrane between the first 4 rays quite deeply incised, outer edge of rays scabrous; ventrals reaching ⅘ to vent, the inner ray longest.

Color.—In the young the color is gray above and white beneath, a dark saddle marking over the back at the center of the first dorsal; another similar marking under the anterior, and another under the posterior end of the second dorsal; a dark spot the size of the eye on top of the caudal peduncle and midway in its length (the young may be distinguished at a glance by this marking on top of the caudal peduncle); a V-shaped marking at the base of the caudal with the angle of the V on the lateral line and directed forward; this marking in the older specimen extends forward into the peduncle spot; the caudal is marked by 2 vertical wavy bands on its posterior half, the first one the wider, the last one at the tips of the rays; these bands are solid, extending across the rays and membrane; the pectorals are dark at the base, the rest marked by 3 vertical black bars; the first dorsal is slightly dusted with black, the second is slightly mottled with black, but with no bars; the anal has 3 or 4 vertical dark bars. In the adults the general appearance of the fish is very much darker, almost black; the lower parts are light; the markings are not so distinct; the fins except the ventrals are all dark, and the markings on the pectorals, caudal, and anal run together into solid black; the lower parts, especially in the males, brilliantly colored with red. (Scofield.) Arctic waters of America, from western Greenland to Bering Straits. This fish seems to differ from *Oncocottus quadricornis* from the Baltic Sea, having a longer maxillary, longer pectorals, and a square-cut caudal fin. All these characters are of doubtful value, and the species may be the same as the European *O. quadricornis*. We can find no good difference between our specimen and a small one from Arctic Bay, western Greenland (received from Prof. D'Arcy W. Thompson). The fish figured by Nelson as *Cottus quadricornis* (Nelson, Natural History of Alaska) is probably the same as the one here described, but according to the figure there are several differences. Scofield and Seale found this fish very abundant along the shores of Herchel Island. It was about the only fish to be found where the bottom was muddy. A few young were taken at Point Barrow, and at Port Clarence, both young and old; 3 of the young were found in the river back of Grantly Harbor. (ἕξ, six; *cornu*, horn.)

Cottus hexacornis.* RICHARDSON Franklin's Journal, 1823, 726, mouth of Tree River near Coppermine River (Coll. John Franklin): RICHARDSON, Fauna Bor.-Amer., III, 44, 1836; GÜNTHER Cat., II. 166. 1860.

Acanthocottus labradoricus, GIRARD, Bost. Journ. Nat. Hist. VI. 1850, 247. pl. 7, fig. 3, Coast of Labrador.

Oncocottus hexacornis, SCOFIELD. in Jordan & Gilbert, Rept. Fur Seal Invest., 1898.

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* *Cottus hexacornis*, Richardson was thus originally described:.

D. VII, 13; A. ; C. 12; P. 16; Br. 6. Head large and depressed. Eyes large. Six club-shaped, or rather nail-shaped. processes stand erect on the top of the head, their summits flattish, minutely cancellated and scabrous; the smallest pair stand between

Cottus labradoricus,* GÜNTHER, Cat., II, 163, 1860; BEAN, Proc. U. S. Nat. Mus., IV, 1881, 128; JORDAN & GILBERT, Synopsis, 704, 1883.

the nares; the largest over the posterior angles of the orbits, and the third, of intermediate size, on the occiput. The mouth is very capacious; its margins are formed by the intermaxillaries and lower jaw; the maxillaries have an elongated wedge form, and lie in a membrane behind the intermaxillaries. Both jaws and vomer are set with bands of 9 teeth, en velours. Tongue obtuse and smooth, as are the palate and maxillaries. The preoperculum is armed beneath with 3 strong, devaricated spines, the posterior one, which measures ½ inch, being the longest. The gill covers are composed of several bones connected by membrane, and armed on the exterior edges with 4 or 5 small, spinous teeth. The bones which support the pectoral fins are also armed with small spines, and have sharp, rough edges. The branchiostegous membrane contains 6 slender, cylindrical, curved rays. The body is much narrower than the head, and tapers to the insertion of the caudal fin. The anus is situated midway between the mouth and the caudal. The lateral line is rough, and runs near the back; above it there is a row of small, orbicular, scabrous, bony plates, the row being doubled opposite to the second dorsal. There are no other perceptible scales. The pectoral fins are suborbicular and contain 16 rays, none of them branched; the upper ray is scabrous throughout; the others are scabrous only near their middles. The ventrals, soft and whitish, have 3 rays, of which the first is the strongest, but none of them are spinous. The first dorsal commences posterior to the pectorals, and terminates opposite to the anus; it has 7 simple rays; the second dorsal is larger, and has 13 rays; its commencement and termination correspond with those of the anal, and most of its rays are scabrous; both dorsals are rounded or arched. The anal fin occupies about ⅔ of the space between the anus and caudal, commencing near the former; this fin becomes slightly lower or less deep posteriorly. The caudal is cuneiform, and has 12 rays, most of them forked. In the form of the bony processes on the top of the head this species approaches closely to *C. quadricornis* of the Baltic; but it does not appear from the descriptions I have consulted that there is a distinct pair on the nasal bones of the latter. There are also differences in the form of the spines of the preoperculum, those of *C. hexacornis* being quite simple, while in the other they are truncated, or divided at the point. In the *C. quadricornis*, also, there is a thick spine on the suprascapular bone, which is likewise truncated; while in *C. hexacornis*, that bone, the humerals, and the gill covers are merely armed with small, spinous teeth; and the rows of scales on the body are different. It appears to me likely that the *C. quadricornis*, Sabine (Zool., App. to Captain Parry's First Voyage, p. ccxiii), may be really the *C. hexacornis*. Capt. J. C. Ross, who considers it to be the same with the *C. scorpioides* of Fabricius, says that though very abundant on the Greenland Coast it is more rare in the higher latitudes, but several were taken on both sides of the peninsula of Boothia. The natives prize it highly as an article of food, preferring it to codfish or salmon. The Esquimaux of Boothia call it Kanecok, the same name which the Greenlanders give to *C. Grœnlandicus.*

Color.—Of the upper aspect a clouded admixture of brocoli-brown and olive-green tints; of the belly white. The fins are streaked with bluish black. Irides tinged with red.

Size.—About 7 inches in total length.

Numerous specimens of this fish were caught in a net set in the mouth of a small river near the Coppermine, and the above description is drawn up from notes written on the spot. The subsequent calamities which befell that expedition having occasioned the loss of all the specimens, no actual comparison has been made with other species; but after an inspection of the Cotti brought home by Captain Beechey, and an attentive perusal of the Histoire des Poissons, I am satisfied that it differs from all other described species in the form of the horns or processes which arm the head, and in other particulars. From the peculiar shape of these horns in our species it might bear the name of *claviger* still more appropriately than the one so termed by *M. valenciennes.* The individuals that we caught retained life long after they were drawn from the water, leaping vigorously over the sands, and when touched inflating the head. In this operation the branchiostegous membrane is distended, and the several pieces composing the gill covers are separated by the extension of the intervening membranes. Our Canadian voyageurs were both astonished and alarmed by these fish, and termed them Crapauds de mer, probably from a kind of croak they uttered when first handled. (Richardson.)

In 1849, having again visited the same region, Richardson procured more specimens of this form which he took home with him. He saw then that he had misunderstood his notes, and wrongly ascribed to *C. hexacornis* rostral horns of the same nature as the characteristic horns of the head and nape, and that the form in question was no other than *C. quadricornis*, an opinion all must accept who, recalling this correction, will read the old description of Sir John. (Lütken.)

*Specimens of *Oncocottus labradoricus*, Girard, are thus described by Dr. Bean:

Eye 5; snout nearly 5. D. X, 14; A. 14; V. I, 3; P. 17; C. 11 (developed). Two small spines above the snout; a rough, irregular prominence above each orbit and 2 similar ones on the occiput. The slight depression on the crown becomes narrower posteriorly where its width is about ½ the length of the space included between the supraorbital and occipital prominences. Four preopercular spines, 2 of which are at the angle, the uppermost and longest is ⅔ as long as the eye; the 2 lower spines are short and extend downward and slightly forward. The length of the longest preopercular spine equals the distance between the eyes measured on the bone. The maxillary is twice as long as

740. TRIGLOPSIS, Girard.

Triglopsis, GIRARD, Proc. Bost. Soc. Nat. Hist., IV, 1851, 18 (*thompsoni*).

Ptyonotus, GÜNTHER, Cat., II, 175, 1860 (*thompsoni;* substitute for *Triglopsis* on account of the prior and similar name, *Triglops*).

Body and head slender. Skin naked; lateral line chain-like. Teeth on vomer, none on the palatines. Eyes large, the interorbital area concave; bones of lower part of head extensively cavernous; a small but distinct slit behind last gill; gill membranes almost free from the isthmus, forming a broad fold across it; preopercular spines straight, simple, 4 in number, the lower turned downward; fins large. Fresh-water fishes, closely related to *Oncocottus*, from which they have doubtless become degraded through fresh-water life. There is no tangible difference in structure in any part of the body. (*τρίγλα, Trigla; ὄψις*, appearance.)

2374. TRIGLOPSIS THOMPSONI, Girard.

Head 3; depth 6. D. VII, 18; A. 15; V. I, 3. Body elongate, very slender. Head long, depressed above; snout long and pointed; eye quite large, nearly as long as snout, much wider than interorbital space, 4 in head; jaws subequal; mouth large, the maxillary extending rather beyond middle of eye; preopercle with 4 sharp spines, the upper much shorter than pupil; cavernous structure of skull highly developed; upper surface of head smooth; gill membranes not broadly united, nearly free from isthmus. Dorsal fins well separated; spinous dorsal short and low, its height little more than length of snout; second dorsal very large, 3 times height of first, its longest rays about as long as head; anal high, ½ as high as second dorsal; pectoral long, reaching past front of anal; ventrals well developed; lateral line chain-like, conspicuous; skin perfectly smooth. Pale olivaceous, with darker blotches; upper fins faintly banded. Length 3 inches. Deep waters of the Great Lakes; not common; known from Lake Michigan and Lake Ontario; doubtless a relic of a former Arctic marine fauna, and descended from a species of *Oncocottus*. (Named for Rev. Zadock Thompson, the accomplised author of the History of Vermont.)

Triglopsis thompsoni, GIRARD, Proc. Bost. Soc. Nat. Hist., IV, 1851, 19, off Oswego, Lake Ontario (Coll. S. F. Baird); GIRARD, Monograph Cottoids, 65; JORDAN & GILBERT, Synopsis, 709, 1883.

Triglopsis stimpsoni, HOY, Trans. Wis. Ac. Sci. 1872, 98, Lake Michigan. (Coll. Dr. William Stimpson.)

Ptyonotus thompsonii, GÜNTHER, Cat., II, 175,1860.

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the eye, about ½ as long as the head to the end of the opercular spine, and extends about to the vertical through the hind margin of the eye. Teeth on the vomer, none on the palatines. Dorsal spines slender; the first twice as long as distance between eyes; third and longest ⅚ as long as maxillary and ½ as long as distance from tip of snout to end of occipital prominences. Base of spinous dorsal ¼ total length without caudal; distance between dorsals 2 in eye. Longest soft dorsal ray (ninth) about as long as middle caudal rays, or ⅙ total length with caudal; pectorals reaching a little beyond origin of anal (to second ray of anal); ventrals as long as postorbital part of head and not reaching vent. Skin above the lateral line with a few spiny tubercles, none of them more than ¼ as long as eye. A small slit behind fourth gill. Coast of Labrador and Hudson Bay. This description by Dr. Bean from specimens taken in 1880 near York Factory, Hudson Bay, by Robert Bell, M. D. This nominal species is apparently the female of *Oncocottus hexacornis*.

741. GYMNOCANTHUS, Swainson.

Gymnocanthus, Swainson, Class. Fish., etc., II, 271, 1839 (*ventralis*).
Phobetor, Kröyer, Naturh. Tidschr., I, 263, 1844 (*tricuspis*).
Elaphocottus, Sauvage, Nouv. Arch. Mus. Paris (2), 1, 1878, 142 (*pistilliger*).

General characters and appearance of *Acanthocottus*, but with no teeth on the vomer, the slit behind the last gill small or wanting; upper preopercular spine stout, armed with 2 or 3 antler-like processes; fins all very large, the ventrals notably so. Arctic Seas. (*γυμνός*, naked; *ἄκανθα*, spine.)

a. Interorbital space not armed with bony granulations; males with a round white spot on belly; last gill arch without slit or pore.
  b. Dorsal rays X, 14 or 15; anal 16; a cirrus behind eye in young; occipital ridge with 3 bony prominences; axial region in male with fringed filaments, white at tip. PISTILLIGER, 2375.
  bb. Dorsal rays XII, 16; anal 18; no cirrus behind eye; occiput without bony prominences; axial region without fringed filaments in either sex. TRICUSPIS, 2376.
aa. Interorbital region covered with bony granulations; males without white spots on belly; dorsal rays XI, 16; anal 19. GALEATUS, 2377.

2375. GYMNOCANTHUS PISTILLIGER (Pallas).

Dr. Gilbert describes this species as follows:

"Compared with *Gymnocanthus tricuspis*, *G. pistilliger* has a different fin formula, the spines and rays of dorsal and anal fins being fewer in number. This is shown by the following table, based on an examination of 40 specimens:

	Spinous dorsal.		Soft dorsal.				Anal.		
Rays	IX.	X.	13.	14.	15.	16.	15.	16.	17.
Specimens	10	30	1	17	21	1	2	28	10

"The normal formula may therefore be given: D. IX or X, 14 or 15; A. 16 or 17. The type of *G. pistilliger* is said to have D. IX, 13; A. 16; and its synonyms, *G. ventralis*, Cuvier & Valenciennes, and *G. intermedius*, Temminck & Schlegel, have, respectively, D. IX, 13; A. 17; and D. IX, 13; A. 14. In *G. tricuspis* the formula is D. XI or XII (rarely X), 15 to 17; A. 16 to 19. The dorsal fins are more widely separated in *G. pistilliger*, where the interspace is equal to ½ or more than ½ the diameter of the pupil. The vertebræ are fewer in number, 12 + 24 instead of 12 + 28. In *G. pistilliger* an obtuse prominence above hinder margin of orbit bears in young individuals a slender cirrus, which frequently disappears in adults. Behind the eye, a continuous occipital ridge bears 3 smaller bony prominences, the first immediately behind the eye, the second and third approximated at posterior end of ridge; these bear no cirri. *G. tricuspis* has no tubercles on occiput. In males of *G. pistilliger*, the post axial region is furnished with a number of very slender filaments, each of which is expanded at tip into a compressed frond-like lamina, having the free edge more or less laciniate or fringed. These expanded tips are bright white and very conspicuous. No trace of them is present in females, but they develop in males at a very early age. These agree with the structures described by Pallas, on which he based the name *pistilliger*. They seem not to be present in *G. tricuspis*. The upper preopercular spine is sharply bifurcate in even our smallest specimens (50 mm.), but in these no trace of a second medial upwardly directed spine is present. The latter is evident in specimens 70 mm. and more in length, and a small concealed prominence representing a third spine is exceptionally present. No trace of slit behind last gill. The following measurements give the depth of body and length of head in millimeters, as compared with total length, in 8 specimens:

Total length.	Length of head.	Depth.
mm.	*mm.*	*mm.*
156	44	27
145	39½	25½
142	38½	24½
135	38	24½
135	40	25
134	37	24
125	34½	21
93	25½	16

Very young examples show no groups of granulations on head or nape, these being usually wanting in specimens less than 100 mm. long. In older examples they are variously developed, the degree of armature dependent neither on age nor sex. They are never armed on interorbital space, being unlike *G. galeatus* in this respect, the granulations being confined to the occipital and nuchal regions, with an additional elongate patch on the upper part of the opercle. In highly developed males, the dorsal and ventral rays are accompanied with series of tubercles. The color is brown above, with very narrow vermiculating lines of lighter; a black blotch on cheek, more conspicuous in males, and 4 inconspicuous cross bars on back; the darker dorsal area is bounded below lateral line by an irregular series of dark streaks or blotches. In males, the lower jaw and preopercle is cross-banded with black and light yellow; the abdomen, lower half of sides in front of anus, and prepectoral region, with large roundish white spots, separated by vermiculating areas, rendered dusky by aggregations of coarse black dots; ventrals dusky and silvery, the latter frequently forming cross bands; spinous dorsal dusky or black, with irregular series of white spots not confined to basal parts of fin. In both sexes the pectorals, second dorsal, and caudal are translucent or yellowish, crossed by narrow black bars. The females are more numerous than the males in our collection, but the disparity in number is not so great as has been found by other writers. In 45 specimens examined as to this, 17 are males, 28 females. Among specimens obtained at Petropaulski and at *Albatross* Station 3646, off Robben Island, in 18 fathoms, no males are included. The females differ from those we have examined from Bristol Bay in having the top of head more extensively plated, the rough plates extending onto middle of interorbital space, or in 1 specimen onto snout. The preorbital ridges are less regular and have lower tubercles. The specimens indicate an approach therefore to *G. galeatus*. The fin rays are as previously given. In 8 specimens they are as follows:

	Dorsal spines.		Dorsal rays.			Anal rays.	
Ray	IX.	X.	14.	15.	16.	16.	17.
Specimens	1	7	1	6	1	3	5

Coasts of Alaska; taken abundantly in Bristol Bay in 4½ to 26 fathoms." (*pistilla*, pistil; *gero*, I bear; in allusion to the axillary papillæ of the male.)

Cottus pistilliger, PALLAS, Zoogr. Rosso-Asiat., III, 43, 1811, Unalaska; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 193, 1829; GÜNTHER, Cat., II, 167, 1860.

Cottus ventralis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 194, 1829, Kamchatka (Coll. Mr. Collée. Type in Brit. Mus.); GÜNTHER, Cat., II, 167, 1860.

Cottus cephaloides, GRAY, in CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 194, 1829, Kamchatka. (Type of *C. ventralis*.)

Elaphocottus pistilliger, SAUVAGE, Nouv. Archiv. Mus. 1878, 142.

Gymnocanthus pistilliger, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 424; SCOFIELD,[*] Rept. Fur Seal Investigations, 1898.

2376. GYMNOCANTHUS TRICUSPIS (Reinhardt).

Head 3⅓; depth 4⅔. D. XII, 16; A. 18; V. I, 3; P. 16; vertebræ 12 + 28 = 40. Nasal spines small; occipital ridges low, the space between them

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[*] Mr. Scofield has the following note on this species:
Three specimens taken at Grantly Harbor, Port Clarence, Alaska.

Fin formulæ.

	D.	A.	P.	C. branched rays.
♂	14	16	18	9
♂	15	17	18	9
♀	13	15	17	9

I have compared them with specimens taken by the *Albatross* in southern Bering Sea and find them the same. In the female taken at Port Clarence the crown (not between the eyes), nape, and upper half of opercles are covered with scabrous bony plates. These plates are present in some of the females taken by the *Albatross*, but are not so evident. The female has a few scattered rough prickles back of the origin of the pectorals. The males have the mushroom-like filaments covered by the pectorals, and the middle rays of the pectorals have papillæ along their inner edge. This fish has been reported from the Atlantic side of North America, but it is probably a different species, as the mushroom-like filaments are not mentioned in their description. Sir John Richardson took a single specimen, a female 5 or 6 inches long, at Hudson Bay, which appears to be the same as these from Bering Sea. He identified it as *Phobetor tricuspis* (Kröyer), and his plate of it agrees perfectly with our specimens, but in his description he does not mention the prickles back of the origin of the pectorals, and he mentions a few scabrous bony plates just below the second dorsal which our specimens do not have.

concave, with rough plates; supraorbital ridge ending in a blunt tubercle; interorbital area with smooth skin. Eyes very large; maxillary extending to pupil; upper preopercular spine broad; much shorter than eye, with about 3 points; skin mostly smooth; axil prickly, but without fringed filaments; inner edge of middle pectoral rays papillose (male). Spinous dorsal very high and long, the longest spines in the male ¾ length of head; second dorsal a little lower; anal very long, rather low; pectorals very broad, reaching past front of anal, the lower rays rapidly shortened; ventrals extremely long, the rays long, exserted, reaching past front of anal; anal papilla large. Dark brown above, with traces of darker vertical bars; belly pale; males with the axillary region dusky, with many large round white spots; first dorsal blackish, with pale blotches; second dorsal with alternating oblique bands of white and blackish; anal and caudal nearly plain; pectorals and ventrals yellowish, with black cross bars; mandible barred with black. Arctic seas, south to Norway and Labrador; not very common on our coasts. Here described from a specimen from Greenland. Dr. Günther gives the following anatomical details: "The liver is large, round, not divided into lobes, and situated principally on the left side of the stomach. The stomach is very spacious and curved; the pylorus with 6 appendages; the intestines appear to make 1 complete circumvolution. The ovaria are separated from each other to their posterior extremity. The urine bladder is narrow, elongate, situated above the right-hand ovarium. Skeleton: The configuration of the skull is much more similar to *C. gobio* than to *C. scorpius* or *bubalis*. The space between the orbits is very slightly concave, very narrow, its width being nearly ⅓ the distance between the upper posterior angles of the orbits. The crown is flat, without any longitudinal or transverse ridges, but with very slight impression in the middle. The frontal bones, the preoperculum, the mandibula, and the infraorbitals have very distinct muciferous channels; the turbinals are provided with a minute spine. The number of the caudal vertebræ is increased, there being 12 in the abdominal portion and 28 in the caudal." (Eu.) (*tres*, three; *cuspis*, cusp.)

Cottus gobio, FABRICIUS, Fauna Grœnlandica, No. 15, 1780, Greenland.

Cottus tricuspis, REINHARDT, Vidensk. Selsk. Nat. Math. Afhandl., VII, 1838, 117, Greenland; GÜNTHER, Cat., II, 168, 1860.

Cottus fabricii, GIRARD, Monograph Cottoids, 59, 1851, Greenland; after *Cottus gobio*, FABRICIUS.

Cottus ventralis, COLLETT, Christiania Vid. Selsk. Forh. 1878, 151; not of CUVIER & VALENCIENNES.

Acanthocottus patris,* H. R. STORER, Bost. Jour. Nat. Hist.. VI, 1857, 250, Labrador. (Coll. Dr. Horatio Robinson Storer.)

Phobetor tricuspis, KRÖYER, Natur. Tidskr., I, 263, 1844.

Gymnocanthus pistilliger, JORDAN & GILBERT, Synopsis, 709, 1883; not of PALLAS.

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* This southern form, named "*patris*" by Dr. H. R. Storer, for his distinguished father, needs comparison with *Gymnocanthus tricuspis*.

2377. GYMNOCANTHUS GALEATUS, Bean.

Head 3¾ (including caudal); depth 7½. D. XI, 16; A. 19; V. I, 3. Body elongate. A small tubercle above each eye; 4 preopercular spines, the longest about as long as eye, and with 2 or 3 processes. Space between eyes deeply concave, completely covered with bony granulations, as are the crown and neck; similar granulations on hinder margin of orbit, on suborbital stay and on opercle. Skin of body naked. Pectorals, and in males the ventrals also, reaching beyond vent; maxillary reaching to below eye. Slit behind last gill not described. Olivaceous; back with 4 distinct brown spots, the longest nearly twice as long as eye, and extending a little below lateral line, there blending with a wavy lateral stripe; dorsals and pectorals with interrupted black band; lower fins plain whitish. Dr. Gilbert describes a single male specimen, 210 mm. long, from Chernofski Harbor, Unalaska Island:

> The sexual peculiarities are less strongly marked than in much smaller males of *G. pistilliger*. The ventrals extend but little beyond the front of the anal fin, and are unmarked. The abdomen is also plain, without the round white spot characteristic of male specimens of *G. pistilliger* and *G. tricuspis*. These marks are apparently absent also in the type, as no mention is made of them. The spinous dorsal is not greatly elevated, its longest spine being contained 2½ times in the head. It is without distinctive markings, being colored like the soft dorsal, light yellowish, cross-banded with darker. Anal papilla short, 5 mm. in length. Plates on head as in description, covering the interorbital region, crown, occiput, and nape as far back as front of dorsal; present also on upper part of opercle, and in a vertical streak immediately behind eye. A very prominent tubercle over hinder margin of eye, a constriction behind it. Occipital ridge broadly rounded, without tubercles or conspicuous prominences of any kind, but with 3 smooth areas corresponding in position with the tubercles of *G. pistilliger*, perhaps present as such in the young. The anterior one is slightly elevated. No superciliary filaments Preopercular spines massive, short, with a single fork at tip, no accessory spines developed.* Axil with prickly scales, but without filaments. Dorsal XI, 16; anal 19. Lateral line 43. Head 52 mm. long; depth 32 mm. The depth is there 6½ in the total length, not 7½ as described for the type.

Aleutian and Pribilof islands; known from Unalaska and St. Paul, and Point Barrow. (*galeatus*, helmeted.)

Gymnocanthus galeatus, BEAN, Proc. U. S. Nat. Mus. 1881, 153, Unalaska (Type, No. 28097. Coll. Sylvanus Bailey); JORDAN & GILBERT, Synopsis, 707, 1883; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 425.

742. LEIOCOTTUS, Girard.

Leiocottus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 133 (*hirundo*).

Body elongate, covered with thick, smooth skin. Head compressed, narrowed above, not externally bony. Mouth small, horizontal, low; villiform teeth in both jaws and on the vomer, none on the palatines; upper preopercular spine short, strong, with bifurcated tip; suborbital stay narrow; gill membranes partly free from the isthmus, over which they form a broad fold; a slit behind fourth gill. First dorsal with its upper margin somewhat S-shaped, the first 2 spines elongate, the middle ones of nearly equal length, and the posterior ones rapidly shortened; ventrals I, 3. Shore fishes of the Pacific. (*λεῖος*, smooth; *κόττος*, *Cottus.*)

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* Mr. Scofield has the following note on a small specimen (3½ inches) collected at Point Barrow, Alaska:

Fin formula: ♀ D. X, 15; A. 17; P. 18; V. 3. Head 3¼ or $3\frac{9}{10}$, including caudal; eye 3½ to end of opercular spine; snout 4; maxillary 2¼ or past posterior edge of pupil; interorbital 2 in length of orbit, depth 5¼; Lat. line 43 or 44. Fifth or sixth ray of pectoral longest and reaching to third anal ray. Ventrals reaching ⅔ to vent. Mouth slightly oblique. Upper preopercular spine with 3 sharp points on its upper side. No papillæ or sharp points under pectorals.

2378. LEIOCOTTUS HIRUNDO, Girard.

Head 3½; depth 4½; eye large, 4½ in head. D. IX, 17; A. 15; V. I, 3. Body elongate, fusiform, the caudal peduncle slender; profile of snout decurved; maxillary reaching front of orbit; 3 small cirri at the end of each maxillary; preopercular margin with several similar cirri; opercle and shoulder girdle without spines; upper preopercular spine as long as pupil. Top of head smooth; supraorbital ridges little elevated; nasal spines distant from tip of snout. Spinous dorsal elevated in front, the first 2 rays much longer than the others, nearly ⅗ length of head; soft dorsal and anal fins rather long; pectorals reaching past front of anal; ventrals to vent. Olivaceous, shaded with light blue and reticulated with brownish red, the latter color predominating on the head; sides with 4 broad, oblique, brownish-red bars, the first 3 running from dorsal forward and downward, the fourth from caudal peduncle backward to base of caudal; abdomen orange brown, with pale spots; caudal orange brown, with yellow bars near the tip; fins with bars and spots of dark brownish red; breast and ventrals whitish; 3 dark blotches at base of pectorals; spinous dorsal with oblique dark streaks; a dark blotch on each eye above, and a light streak forward and downward from eye. Length 10 inches. Santa Barbara Islands, in shallow water; not rare, but extremely local. (*hirundo*, swallow.)

Leiocottus hirundo, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 133, San Miguel Island, near Santa Barbara (Coll. Lieutenant Trowbridge); GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 62, 1858.

Cottus hirundo, GÜNTHER, Cat., II, 166, 1860.

Liocottus hirundo, JORDAN & GILBERT, Synopsis, 712, 1883.

743. LEPTOCOTTUS, Girard.

Leptocottus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1854, 130 (*armatus*).

Body elongate, depressed, covered with perfectly smooth skin. Head depressed, oblong, not very broad, without cirri; lower jaw included; suborbital stay narrow; teeth on jaws, vomer, and palatines. Gill membranes rather narrowly joined to the isthmus, not forming a fold across it; a slit behind fourth gill; preopercular spine strong, with 2 or 3 points hooked upward. Dorsal fins separate; the spinous dorsal short and small, entire; ventrals I, 4. Shore fishes of the Pacific. (*λεπτός*, slender; *κόττος*, *Cottus.*)

2379. LEPTOCOTTUS ARMATUS, Girard.

(Smooth Cabezon.)

Head 3 in length; depth 6. D. VII, 17; A. 17; V. I, 4. Head long and depressed; mouth large, the maxillary reaching beyond eye; interorbital space broad, scarcely concave; nasal spines concealed; top of head flattish, covered with rugose skin; upper preopercular spine with 3 or 4 spinules hooked upward; suborbital stay slender, not reaching preopercle; eye very small, less than interocular width, 7½ in head; lateral line complete; skin everywhere smooth; no prickles nor cirri. Dorsal spines very slender and low; pectorals reaching or extending beyond vent; ventrals halfway to vent. Grayish olive above, becoming abruptly white and silvery below; sides creamy; pectoral fins creamy yellow, with 5 or 6 black cross bars; spinous dorsal dusky, with an ink-like blotch on tip of last rays, and an oblique white band below; soft dorsal dusky with several oblique white bands; caudal banded; ventrals and anal plain. Length 12 inches. Pacific Coast from Kadiak to San Diego; everywhere very common, the most abundant of the Cottoids of our west coast; living near shore. It flattens the head and expands the preopercular spines when disturbed. (*armatus*, armed.)

Leptocottus armatus, Girard, Proc. Ac. Nat. Sci. Phila. 1854, 131, Cape Flattery, Fort Steilacoom, Willapa Bay, Humboldt Bay, San Francisco, Monterey, San Pedro, Fort Point, San Diego, Tomales Bay (Coll. Dr. Suckley, Dr. Cooper, Lieut. Trowbridge, etc.); Girard, U. S. Pac. R. R. Surv., x, Fish., 60, 1858; Jordan & Gilbert, Synopsis, 714, 1883.

Centridermichthys armatus, Günther, Cat., ii, 171, 1860.

744. CLINOCOTTUS, Gill.

Clinocottus, Gill, Proc. Ac. Nat. Sci. Phila. 1861, 166 (*analis*).

This genus differs from *Oligocottus* in having the skin of the sides of body mesially, covered more or less thickly with minute prickly scales embedded in the skin; anteriorly, forked cirri take the place of scales; mouth with lateral cleft; preopercular spine short, bifurcate. Small fishes of the California rock pools. (*Clinus; Cottus.*)

2380. CLINOCOTTUS ANALIS (Girard).

Head 3½; depth 4½. D. IX, 16 to 18; A. 13 or 14; V. I, 3; P. 15. Head narrower anteriorly and rather pointed; mouth with lateral cleft, the maxillary reaching beyond pupil; band of palatine teeth short and narrow, often absent on one side or on both; eye large, 5 in head, about twice the width of the deeply grooved interorbital space; nasal spines distant from snout; preopercular spine short, bifurcate; cranium plane above; upper part of body mesially covered with minute, embedded, nonimbricated, pectinate scales; anteriorly, small cirri, mostly bifid or trifid, take the place of the scales. Head, especially above, with very many similar cirri; a fringe of cirri on edge of preopercle. Dorsal fins contiguous, rather low; pectoral reaching past front of anal; anal papilla very large.

Olivaceous, sometimes very pale, sometimes nearly black, occasionally dashed with reddish, much mottled, and with numerous small black and white spots; about 5 irregular darker bars; a dark bar at base of caudal; fins all spotted; cirri very numerous, mostly whitish, giving the fish a woolly appearance in life. Length 3 to 7 inches. Coast of California; abundant in rock pools from Monterey southward to Lower California, farther south than any other of the California *Cottidæ*. (*analis*, from the large anal papilla.)

Oligocottus analis, GIRARD, Proc. Ac. Nat. Sci. Phila. 1857, 201, Monterey (Coll. A. S. Taylor. Type, No. 486, U. S. Nat. Mus.); GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 57, 1858; JORDAN & GILBERT, Synopsis, 718, 1883.

Cottus criniger, GÜNTHER, Cat., II, 522, 1860, Monterey, California

Centridermichthys analis, GÜNTHER, Cat., II, 171, 1860.

Clinocottus analis, JORDAN & EVERMANN, Check-List Fishes North and Middle America, 444, 1896.

745. OLIGOCOTTUS, Girard.

Oligocottus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 133 (*maculosus*).

Body rather elongate, the skin smooth; preopercular spine slender and sharp, simple or with a single antler-like process above; small tentacles on head and anterior parts of body; gill membranes broadly united, free from the isthmus; slit behind fourth gill small or obsolete; dorsal spines slender, the fin short and not emarginate; anal papilla of male large; ventrals I, 3. Small fishes of the North Pacific, inhabiting rock pools between tide marks, the very smallest of the *Cottidæ*. (ὀλίγος, small; *Cottus*.)

a. Preopercular spine bifid, having a process directed upward in addition to the pointed spine; D. VIII, 16; A. 12 to 14.
  b First dorsal without ocellate spot; head with many cirri; male with the anterior rays of anal enlarged and detached. MACULOSUS, 2381.
  bb. First dorsal with a black ocellus; cirri on head few; anal fin in males with the anterior rays not especially enlarged or detached. BOREALIS, 2382.

2381. OLIGOCOTTUS MACULOSUS, Girard.

(JOHNNY.)

Head 3; depth 4. D. VIII–16; A. 12 to 14. Head slender, narrowed above, the snout rather pointed; maxillary reaching pupil; top of head with several scattered cirri; a few on sides of head; cirri on lateral line anteriorly and on front of back, also along base of dorsals. No scales or prickles anywhere; preopercular spine forked; front rays of anal enlarged and detached in males; anal papilla large (in males); pectorals reaching well beyond front of anal. Usual color, reddish brown, varying to gray, intense green or crimson according to surroundings, the vivid colors developed in the presence of similarly colored algæ; fins all barred; belly usually livid bluish or greenish; lower side of head with white mottlings. Length 2 to 3 inches. Pacific coast, from Cape Mendocino to Point Concepcion, rather common; one of the smallest of the marine *Cottidæ*, a bright-colored inhabitant of rock pools. (*maculosus*, spotted.)

Oligocottus maculosus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1856, 153, Tomales Bay (Coll. E. Samuels); San Francisco (Coll. Lieut. Trowbridge); Fort Steilacoom (Coll. Dr. G. Suckley); GIRARD, U. S. Pac. R. R. Surv., x, Fish., 56, 1858; JORDAN & GILBERT, Synopsis, 718, 1883.

Centridermichthys maculosus, GÜNTHER, Cat., II, 171, 1860.

2382. OLIGOCOTTUS BOREALIS, Jordan & Snyder.

Head $3\frac{1}{5}$; depth $4\frac{1}{3}$; orbit 4 in head; snout 4; maxillary $2\frac{4}{5}$. D. VIII or IX-16 or 17; A. 12 to 14; P. 14; highest dorsal spine 3; dorsal ray $2\frac{1}{5}$; caudal ray $1\frac{1}{2}$; first anal ray, male $1\frac{1}{2}$, female 3; ventrals $1\frac{5}{6}$; caudal peduncle $3\frac{1}{2}$; pectorals 3 in length. Body compressed, elongate; back somewhat elevated, deepest below middle of spinous dorsal. Head almost as wide as long, tapering from behind to the somewhat pointed snout; profile of head rounded above, straight below; mouth terminal, nearly horizontal; maxillary extending to vertical through posterior part of pupil; lower jaw included; jaws, vomer, and palatines with villiform teeth; snout as long as orbit; eye high in head; interorbital space narrower than width of orbit, its concavity angular; opercle with a triangular flap; angle of preopercle produced into a forked spine, which is covered with skin, except on the sharp points; prongs of preopercular spine $\frac{1}{2}$ as long as orbit; nasal spines prominent; the long premaxillary processes forming a sharp ridge between the latter; branchiostegal membranes forming a fold across the isthmus; gills $3\frac{1}{2}$, the slit behind the fourth arch much reduced; pseudobranchiæ present; gill rakers represented by a few protuberances on the arch. Skin smooth; filaments on free end of maxillary, on inferior edge of preopercle, and first dorsal to the bases of the pectoral fins; also a row of filaments extending along the supraorbital crest, over the back of the head and along the lateral line for about $\frac{1}{2}$ the length of the body, the filaments usually paired, i. e., 2 grow from the same place; anal papilla prominent; large mucous pores scattered about the top and sides of head; pores of lateral line 36 to 40. Dorsal fins 2, separate; first dorsal 4 in head and body, curving from distal end of first spine to posterior part of base; spines rather feeble; second dorsal 2 in head and body, a little higher than first, its middle rays longest; anal fin about $3\frac{1}{4}$ in head and body; in the male the first and second rays longest, the third, fourth, and fifth each a little shorter than the preceding one, the last shortest; in the female the first ray is the shortest; caudal fin somewhat rounded; pectoral rays below the sixth ventrally free from the connecting membrane for a portion of their length; ventral fins reaching to vent, in some specimens to anal. Color, usually reddish brown, varying to gray, intense green or crimson, according to surroundings, the colors developed in the presence of similarly colored algæ; dorsals, pectorals, and caudal barred; anal sometimes barred; front of spinous dorsal with an ocellated black spot. Pacific Coast, from Prince William Sound to Oregon; the types collected in tide pools at Neah Bay, Puget Sound, by Mr. E. C. Starks. Others were collected at Neah Bay by Mr. Henry St. Clair, and still others in Departure Bay, Vancouver Island, by Dr. C. H. Gilbert. This species is closely related to *Oligocottus maculosus*, but may be distinguished from the latter by having fewer filaments on the head and body, an ocellated spot on front of first dorsal, and by having the rays of the anal fin in the male all connected by membrane; the first ray of anal is much shorter and weaker in *O. borealis*. (*borealis*, northern.)

Oligocottus borealis, JORDAN & SNYDER, Proc. Cal. Ac. Sci., Series 2, vol. VI, 1896, 225, Neah Bay. (Coll. E. C. Starks. Type, No. 3396. L. S. Jr. Univ. Mus.)

746. OXYCOTTUS, Jordan & Evermann, new genus.

Oxycottus, JORDAN & EVERMANN, new genus (*acuticeps*).

This genus is allied to *Oligocottus*, differing in the absence of upward process on the sharp, upwardly curved preopercular spine. No slit behind last gill. (ὀξύς, sharp; *Cottus*.)

a. Snout sharp; anal rays 12 or 13.	ACUTICEPS, 2383.
aa. Snout bluntish; anal rays 10.	EMBRYUM, 2384.

2383. OXYCOTTUS ACUTICEPS (Gilbert).

Head 3½ to 3⅔; eye 4 in head; snout 4. D. VII or VIII, 15 or 16; A. 12 or 13. Head slenderer and with sharper snout than in *O. maculosus*. Interorbital space slightly concave, its width ½ eye; maxillary region vertical just in front of the pupil, 3 in head. Cardiform teeth on jaws, vomer, and palatine bones. Preopercular spine slender, sharp, curved upward and inward, neither notched nor forked. Preopercular margin unarmed below it; nasal spines sharp; occiput without ridges or spines; opercle thickened above, ending behind in a rounded lobe; without definite ridge or spine. Branchiostegals 6; no evident pores behind last gill; gill membranes broadly united, free from the isthmus. A cirrus at inner base of nasal spines, 3 pairs evenly spaced on top of head, 1 above orbits, 1 posteriorly on occiput, and 1 midway between these 2; a cirrus at angle of opercle; 1 above each pore on anterior portion of lateral line; sides of body otherwise smooth, without further cirri and without axillary and other prickles. Dorsal fin usually slightly joined at base; pectorals reaching to or slightly beyond front of anal fin; ventrals short, equaling length of snout and eye, extending halfway to front of anal; anus anterior in position, thus differing from *O. maculosus* and *C. analis*, its distance from base of ventrals but ½ its distance from front of anal fin; pores of lateral line 33, each of the anterior 15 usually accompanied by a cirrus. Fin rays in 7 specimens are as follows:

	Spinous dorsal.		Soft dorsal.		Anal.	
Rays	VII.	VIII.	15.	16.	12.	13.
Specimens...	2	5	3	4	3	4

Color varying with the surroundings, often nearly uniform bright green. When dark markings are present, we usually find 6 short wedge-shaped dorsal bars, widening rapidly below, and joining one another by their extreme tips; below these a dusky wavy lengthwise streak, and another wider one below lateral line, the latter marked posteriorly by round white spots, the size of pupil; occiput dusky; a black bar from eye to snout; 1 from eye to behind maxillary; 1 from eye to base of preopercular spine; the interval between these subocular bars may be silvery white; spinous dorsal often showing 2 dark bars, as in *B. globiceps;* ventrals plain; fins otherwise finely mottled or indistinctly barred; some or all of these dark markings sometimes absent. Prince William Sound (Arthur White Greeley) to Vancouver Island. Four specimens, the largest 47 mm. long, from tide pools at Unalaska, are the types of the species. Three additional specimens were taken in Departure Bay, Vancouver Island. (Gilbert.) (*acutus*, sharp; *-ceps*, head.)

Oligocottus acuticeps, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 432, Unalaska (Coll. *Albatross*).

2384. OXYCOTTUS EMBRYUM (Jordan & Starks).

Head 4; depth 4¼. D. IX, 15; A. 10; orbit 4 in head; snout 4; maxillary 2⅚; highest dorsal spine 2½; dorsal ray 1¾; anal ray 1¾; length of caudal fin 1⅖; ventrals 1⅙; pectorals 2½ in body. Body elongate, compressed, back slightly elevated, deepest under spinous dorsal; caudal peduncle moderately slender. Skin without scales or prickles; head small, tapering rapidly forward to the rather sharp snout as viewed from above; profile of head straight below, acutely and evenly rounded above; mouth terminal and horizontal; maxillary reaching to the vertical from the middle of pupil; lower jaw included; teeth on jaws, vomer, and palatines in narrow villiform bands; process of premaxillary prominent, extending slightly above nasal spines, giving the appearance of 3 spines above snout; eye set high in head, the orbit as long as snout; preopercular spine short, blunt, and triangular, entirely covered with the skin, edge of preopercle below, entire; opercle ending in a short flap; top of head with 2 rows of "mossy" cirri, running from the superior orbital margin, curving over head and continuing on lateral line, they disappear on its anterior third. Dorsal spine rather stout, the fin lower than soft dorsal, rounded in outline; soft dorsal well separated from spinous, the front of fin the highest; pectorals long, the eighth ray the longest, giving the fin a point behind which reaches to the base of about the seventh dorsal ray; the same rays below the eighth swollen and posteriorly free from the membrane; anal about as high as soft dorsal, the rays somewhat swollen and more or less free; ventrals long, reaching about to front of anal, their insertion behind base of pectoral a distance equal to the snout and eye; caudal fin slightly rounded. Color variable from light green to a rich maroon; traces of 5 or 6 dark cross bars on back; lower parts dusky with small light spots; belly white; a dark bar from eye to side of snout, 1 from eye to edge of preopercle behind end of maxillary, and another from eye to below preopercular spine; lips black; lower rays of pectorals crossed with black and white bars which fade out above; ventrals light with some dusky mottlings; dorsal dark above, light at base, no markings; anal with black and white bars running across the rays, caudal fin mottled. In this species the preopercular spine is very short, sharp, turned upward, and covered by skin. It has a more acute snout than *B. globiceps*, mouth with a lateral cleft, body more compressed, and the premaxillary process extending above nasal spines. Puget Sound to Monterey, scarce; 2 specimens collected in the tide pools left in the sand on a beach near Neah Bay, the largest 2¾ inches in length. A third specimen, darker in color, obtained at Point Lobos, Carmelo Bay, near Monterey, by Mr. John O. Snyder. (*ἐν*, in; *βρύον*, sea moss.)

Oligocottus embryum, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 808, pl. 82, Neah Bay, Washington. (Type, No. 3128 L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

747. BLENNICOTTUS, Gill.

Blennicottus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 166 (*globiceps*).

This genus is very close to *Oligocottus*, differing in the form of its preopercular spine, which is short, blunt, and simple. Head short and blunt, the cleft of the mouth largely or wholly anterior. Last gill slit obsolete. North Pacific. (*Blennius*; *Cottus*.)

a. Head nearly globular, very blunt; the cleft of mouth not extending on its side; preopercular spine with a short point; ventrals 1⅕ to 1⅓ in head; D. IX, 16; A. 11.
  b. Head with rather few cirri. GLOBICEPS, 2385.
  bb. Head with very many cirri. var. BRYOSUS, 2385*a*.

2385. BLENNICOTTUS GLOBICEPS (Girard).

Head 3¾; depth 4½. D. IX, 16; A. 11; V. I, 3. Body little compressed; head extremely short and blunt, narrowed above, nearly everywhere convex. Mouth anterior, short and broad, almost without lateral cleft; lower jaw shortest; maxillary reaching past front of the small eye; interorbital space very narrow, grooved, about ½ width of eye; preopercular spine with a single point turned upward; top of head with 2 series of cirri; none on sides of head, except a few on upper part of opercle; a series of cirri along anterior half of lateral line; skin without scales or prickles; pectorals reaching beyond front of anal. Dark olive, with obscure darker cross bars; first dorsal with 2 dark streaks above; fins generally barred with greenish, orange, or blue; cirri mostly black. Length 3 to 4 inches. Pacific Coast, from Kadiak to San Diego; the typical form from San Diego northward to Oregon; in rock pools, rather rare, more common southward. (*globus*, globe; *-ceps*, head.)

Oligocottus globiceps, GIRARD, U. S. Pac. R. R. Surv., Fish., 58, 1858, South Farallones. (Coll. Lieut. Trowbridge. Type, No. 300, U. S. Nat. Mus.); JORDAN & GILBERT, Synopsis, 718, 1883.
Centridermichthys globiceps, GÜNTHER, Cat., II, 171, 1860.
Blennicottus globiceps, JORDAN & STARK, Proc. Cal. Ac. Sci. 1895, 808.

Represented in Puget Sound and northward to Kadiak by

2385^a. BLENNICOTTUS GLOBICEPS BRYOSUS, Jordan & Starks.

Northern specimens are larger in size, 4 to 6 inches, with paler and more variegated coloration and red markings; the preopercular spine is stronger and slightly hooked upward, and the opercle has many more cirri above than in the southern form. These differences are very slight and perhaps unworthy of notice. (*βρύον*, sea moss, from the cirrous head.)

Blennicottus globiceps bryosus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 808, Point Orchard, Seattle. (Coll. E. C. Starks.)

748. HISTIOCOTTUS, Gill.

Peropus, LAY & BENNETT, Beechey's Voy., Zool., Fish., 59, 1839 (*bilobus*); name preoccupied.
Histiocottus, GILL, Proc. U. S. Nat. Mus. 1888, 573 (*bilobus*).

This genus is very close to *Blepsias*, from which it differs in the absence of smooth areas on the body; the fins are lower, the dorsal not emarginate, and the pectoral much larger, perhaps capable of being used for flight. North Pacific. (*ἱστίον*, sail; *Cottus*.)

2386. HISTIOCOTTUS BILOBUS (Cuvier & Valenciennes).

D. IX, 21; A. 18; P. 16. Body shorter and deeper than in *Blepsias cirrhosus*, with thicker caudal peduncle and heavier head, the bones less firm; snout short, obtuse, interorbital space very wide, concave, ½ wider than the small eye; short occipital ridges present, besides several bluntish tubercles. Mouth broad, oblique, the maxillary reaching pupil; teeth small, distant; barbels as in *cirrhosus*. Head and body covered with prickles, larger and blunter than in *cirrhosus;* no naked patches on body; fins less developed than in *cirrhosus;* first 5 or 6 spines of dorsal subequal, the last 3 abruptly shorter; pectorals longer and much broader than in *cirrhosus*, reaching seventh anal ray; caudal short, much shorter than head. Olivaceous, paler below; dorsal region with 4 or 5 black bars, reaching ⅓ the distance to the lateral line, and somewhat continued on the fins; caudal with a black bar at base, otherwise plain; pectorals and anal blotched with black. Coast of Alaska and Kamchatka, not very common; the specimen here described from Kadiak. (*bilobus*, two-lobed.)

Blepsias bilobus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 379, 1829, Kamchatka (Coll. M. Collée, Brit. Mus.); GÜNTHER, Cat., II, 153, 1860; JORDAN & GILBERT, Synopsis, 720, 1883.
Peropus bilobus, BENNETT, Beechey's Voy., Zool., Fish., 59, 1839.

749. BLEPSIAS, Cuvier.

Blepsias, CUVIER, Règne Animal, Ed. 2, 1829 (*cirrhosus*).

Head and body compressed; skin hispid with stiffish villiform prickles, and with definitely naked areas; snout and chin with several rather long barbels; mouth small; teeth villiform, on jaws, vomer, and palatines; preopercle with 2 short blunt spines; gill membranes free from the isthmus; gills 4, a slit behind the fourth; top of head with bony ridges; suborbital stay narrow; first dorsal short, elevated in front, emarginate, the spines slender; second dorsal large; anal similar, lower; ventrals very short, I, 3; pectorals long. North Pacific. (An old name of some fish; from *βλέπω*, look.)

2387. BLEPSIAS CIRRHOSUS (Pallas).

Head 3¾; depth 3¾. D. V–III, 23; A. 20; P. 12; scales 50. Supraocular ridges well developed; interorbital space concave, with 2 low ridges extending backward from nasal spines, diverging toward occipital ridges; the latter large, partly interrupted; suborbital stay conspicuous; temporal ridge present; maxillary reaching to beyond middle of pupil; snout with 5 barbels, chin with 6, the longest about as long as the eye, which is 3⅔ in head; a small cirrus on each interorbital ridge; interorbital space as wide as eye; sides with 3 or 4 pale, well-defined, naked areas behind pectorals, the 2 anterior much the largest; behind these a long naked strip along the lateral line, colored like the rest of the body; first 4 spines of dorsal elevated, ⅔ to ¾ length of head; the fifth much shortened; membrane deeply notched between the fifth spine and the sixth, which is longer than the one before it; ventrals as long as eye; pectorals reaching much beyond front of anal; first rays of soft dorsal short; the others gradually lengthened to near the last, the highest higher than the dorsal spines; caudal longer than head. Dark olivaceous, sides of back with 4 to 6 vertically oblong black blotches edged with paler, not reaching nearly to lateral line; belly and naked areas on sides whitish; black bands radiating from eyes; fins dark, with large pale blotches and dark spots; caudal with light and dark bars; ventrals plain; a small white spot on front of spinous dorsal. Adults from Unalaska show the following color: Olive green of varying shades, the belly bright coppery yellow, the cross blotches on back nearly black, with paler margins; naked patches on sides white or brassy, those on tail colored like body, those on head silvery; first dorsal light olive, with 2 translucent patches; second dorsal mottled olive with dark spots and translucent patches; caudal with 3 blackish and 4 translucent bands; anal yellowish olive with numerous spots and translucent patches; radiating blackish bands running out from eye; the upper barbels black, the lower olive. Length 6 inches. Alaska to San Francisco, in shallow water; not rare northward; common at Unalaska; known also from Petropaulski and Iturup Island; not often seen south of Puget Sound. (*cirrhosus*, bearing cirri.)

Trachinus cirrhosus, PALLAS, Zoogr. Ross.-Asiat., III, 237, 1811, Avatcha Bay, Kamchatka (Coll. Merk); Gulf of Penshin, Ochotsk Sea.

Blepsias trilobus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 375, 1829; same types.

Blepsias cirrhosus, GÜNTHER, Cat., II, 153, 1860; STEINDACHNER, Ichth. Beit., V, 128, 1876; JORDAN & GILBERT, Synopsis, 719, 1883.

750. NAUTISCUS, Jordan & Evermann, new genus.

Nautiscus, JORDAN & EVERMANN, new genus (*pribilovius*).

This genus is closely allied to *Nautichthys*, having the same gill structures and dentition, but the first dorsal is only moderately elevated, its height being less than depth of body. There are no cirri on the head, and there is no marked depression at the occiput, the base of the dorsal being little raised above the nape; preopercle with four obsolete spines; skin rougher than in *Nautichthys*, the anal fin shorter. Bering Sea. (a diminutive of *ναυτής*, a ship, from the low first dorsal.)

2388. NAUTISCUS PRIBILOVIUS, Jordan & Gilbert, new species.

Differing from *N. oculofasciatus* in the shorter lower fins, the lower cranial ridges, and the coloration. Head 3 to 3⅓; depth 3⅗. D. VIII, 23; A. 15; V. I, 3; P. 15; eye 3¼ in head; maxillary 2⅗; lateral line with 39 spines.

Shape of head and body much as in *N. oculofasciatus;* head short, the snout rather sharp, the anterior profile steep; nasal spines prominent, a short occular cirrus, much smaller than in *N. oculofasciatus*, shorter than pupil; interobital space narrow, about ½ eye, deeply concave; a blunt triangular ridge above each orbit, with a deep cross furrow behind it which deepens to a pit at the vertex; nuchal ridges lower than in *N. oculofasciatus*, each with a coarse tubercle, lower and larger than in the other species. From the nuchal depression, the base of first dorsal spines rises much less abruptly. Preopercle with 4 blunt prominences, the upper often longer and more spine-like. Mouth nearly horizontal, the lower jaw included; a slender filament at end of maxillary; teeth small, a few on vomer and a narrow band on palatines. Gill membranes broadly united to isthmus, the gill opening extending a little below the lower edge of pectoral. Skin covered with close-set villous prickles, among which large ones are frequently seen arranged in rather definite longitudinal series, of which there may be 2 or 3 parallel with the back, and 1 running near lower line of tail. No smooth areas on sides. Lateral line conspicuous, the plates with short spines directed backward. Dorsals separate, the first not notched, comparatively low, the first spine highest, 1⅔ in head in type; in other specimens 1¼ to 1⅙ in head; soft dorsal and anal also low, none of the rays reaching base of caudal when depressed; pectoral longer than head; ventrals 1½ to 2 in head. Color, dull light olivaceous, mottled with darker; 3 or 4 dark bands below soft dorsal, 1 below spinous dorsal; a black band through eyes and across cheeks, extending onto branchiostegal membranes; 7 dusky spots along lateral line, a conspicuous pink blotch, rather larger than pupil, between first and second blotch; first dorsal dusky; second dorsal, anal, and pectoral dotted and checked; caudal with faint finely checked cross lines which deepen to form a dark bar at its base and a broader one toward its tip; ventrals pale; belly mottled. Bering Sea. One specimen, 6 cm. long, from *Albatross* Station 3635, off St. George Island, in 23 fathoms. Another specimen barely an inch long was dredged in 7 fathoms in the harbor of Unalaska. Very numerous specimens were obtained by the *Albatross* in 1890 in Bristol Bay and south of the Alaskan Peninsula. It was at that time incorrectly identified by Dr. Gilbert with *N. oculofasciatus.* In 5 specimens of those from Bristol Bay the dorsal contains VIII or IX, 23 or 24 rays, the anal 16 or 17, the pectoral 15 or 16. (*pribilovius,* from the Pribilof Islands, named for their discoverer, Gerassim Pribilof, 1786.)

Nautichthys oculofasciatus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 434; not of GIRARD.
Nautichthys pribilovius, JORDAN & GILBERT, Fishes Bering Sea, MS., 1898, off St. George Island. (Type, No. 48237, U. S. Nat. Mus. Coll. Dr. Jordan.)

751. NAUTICHTHYS, Girard.

Nautichthys, GIRARD, U. S. Pac. R. R. Surv., x, Fishes, 74, 1858 (*oculofasciatus*).

Body rather elongate, compressed, but not elevated, the skin evenly covered with short, close-set, villiform prickles. Head short, strongly compressed, the cheeks subvertical; orbital ring much elevated above, with several blunt protuberances behind; nape much depressed, with the base of the dorsal fin rising abruptly above it; mouth small; teeth on jaws, vomer, and palatines; preopercle with small, bluntish spines above; gill membranes broadly united to the isthmus; a slit behind fourth gill; branchiostegal 6; first dorsal falcate, the spines very flexible, the anterior much elevated, much longer than head, the posterior rapidly shortened; second dorsal long and rather high; anal fin similar to second dorsal, but shorter and lower; pectorals moderate; ventrals I, 3, well developed, nearly as long as head. Pacific Coast. Small fishes, of singular appearance. (*ναύτης*, sailor; *ἰχθύς*, fish; in allusion to the development of the first dorsal fin.)

2389. NAUTICHTHYS OCULOFASCIATUS (Girard).

Head 3½; depth 3¾. D. IX, 28; A. 19; P. 14; V. I, 3; scales 44. Maxillary reaching to opposite pupil; eye very large, longer than snout; nasal spines conspicuous, curved; maxillary and edge of preopercle with minute cirri; orbit with a branched cirrus, as long as pupil; the narrow interorbital space deeply channeled; supraocular ridge posteriorly with 3 blunt tubercles; 2 compressed tubercles on each side of first dorsal; a deep pit at nape, extending under origin of first dorsal; spinous dorsal smooth; rays of soft dorsal and caudal roughened with prickles; dorsal spines nearly twice length of head; ventrals ¾ length of head, a little shorter than caudal; pectorals long. Grayish above; sides with dark marblings and obscure dusky bands; a very conspicuous black band through eye and across cheek; first dorsal blackish; other fins barred with light and dark; ventrals plain. Length 6 inches. Pacific Coast, Kadiak to San Francisco, chiefly northward; not rare in Puget Sound; a most singular-looking fish. (*oculus*, eye; *fasciatus*, banded.)

Blepsias oculofasciatus, GIRARD, Proc. Ac. Nat. Sci. Phila. 1857, 202, Fort Steilacoom, Washington. (Coll. Dr. Geo. Suckley. Type, No. 512, U. S. Nat. Mus.)

Nautichthys oculofasciatus, GIRARD, U. S. Pac. R. R. Surv., x, Fish.. 74, 1858; GÜNTHER, Cat., II, 157, 1860: STEINDACHNER, Ichth. Beitr., v, 130, with plate; JORDAN & GILBERT, Synopsis, 727, 1883; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 810.

752. ULCA, Jordan & Evermann.

Ulca, JORDAN & EVERMANN, Proc. Cal. Ac. Sci. 1896, 227 (*marmoratus*).

The genus is close to *Hemitripterus*, from which it differs in its shorter first dorsal of about 14 spines, the first 4 of which are not differentiated, the fin therefore not emarginate. Alaska. (*Ulke*, the Danish-Norwegian name for all *Cottidæ*.)

2390. ULCA MARMORATA (Bean).

Head 2⅔; depth 3⅔. D. XIV, 12; A. 13; V. I, 3; lateral line (tubes) 44. Eye about as long as snout and ¼ as long as head. Pectorals reaching to the vertical through the anal origin; ventral scarcely longer than eye. Gill membrane free from isthmus. Maxillary reaching beyond end of eye. First dorsal base as long as head without snout, the first 4 spines less elevated and differentiated than in *Hemitripterus*. Sides dark gray, intermingled with whitish reticulations. Type 2¾ inches long. North Pacific and Bering Sea, in deep water. (Bean). Dr. Gilbert notes also: "Several small specimens were secured in Bering Sea, to the north of Unalaska Island, depths 70 to 121 fathoms. They agree with the types in having but 14 dorsal spines, the first 4 of which are not noticeably differentiated. The second dorsal contains 11 or 12 rays, and the anal fin 13. The last 2 rays of the anal fin are approximated at base, but do not evidently constitute a divided ray." (*marmoratus*, marbled.)

Hemitripterus marmoratus, BEAN, Proc. U. S. Nat. Mus. 1890, 43, off Sitkalidak Island, at Albatross Station 2855 in 69 fathoms; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 410.

? *Cottus villosus*, [*] PALLAS, Zoogr. Ross.-Asiat., III, 129, 1811, Cape of Kronok and mouth of the Itscha; after STELLER; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 196, 1829.

753. HEMITRIPTERUS, Cuvier.

(SEA RAVENS.)

Hemitripterus, CUVIER, Règne. Anim., Ed. 2, vol. 2, 164, 1829 (*americanus*).

Body moderately elongate, scaleless, but the skin covered with prickles and bony protuberances of various sizes and forms. Head large, with numerous bony humps and ridges and fleshy slips above; orbital rim much elevated, the interorbital space deeply concave; a depressed area at the occiput, behind which are 2 blunt spines on each side. Mouth very wide; jaws, vomer, and palatines with broad bands of teeth; no slit behind last gill; gill membranes broadly united, free from isthmus; preopercle with stout, blunt spines; suborbital stay very strong, forming a sharp ridge. Spinous dorsal much longer than the soft part, of 16 to 18 spines, of which the first 2 are the highest, and the fourth and fifth shorter than the succeeding ones, the fin thus deeply emarginate; pectoral fins very broad, much procurrent; ventrals I, 3. Large fishes of singular appearance, inhabiting the North Atlantic and Pacific. Dr. Gill makes of them a distinct family on account of the great length of the spinous dorsal and the peculiar development of the myodome. The genus is, however, related to *Blepsias* and *Nautichthys*, and the spinous dorsal is as long in *Jordania* as in *Hemitripterus*, while the two genera stand as extremes in the Cottoid group. (ἡμι—, half; τρεῖς, three; πτερόν fin.)

a. Dorsal spine about 16; the upper surface of head moderately uneven. AMERICANUS, 2391.
aa. Dorsal spines 18; top of head excessively uneven. CAVIFRONS, 2392.

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[*] Some unknown fish allied to *Ulca marmorata* is *Cottus villosus*, Pallas. Size, form, and dimensions of *Oncocottus quadricornis*, the same intestines, but with a disagreeable smoke-like odor. Its skin is soft, loose, sand-colored, covered with villosities like a calf's tongue. On the lateral line these prickles are stronger and ⅔ of a line to a line in diameter. Eight soft cutaneous flaps each 3 lines long, and bifid or trifid, at equal intervals on the lower jaw; belly white, back varied and marked with brown. Cape of Kronok and mouth of the river Itscha. Known only from notes of Steller. (Pallas). (*villosus*, hairy.)

2391. HEMITRIPTERUS AMERICANUS (Gmelin).

(SEA RAVEN.)

Head 2⅔; depth 3¾. D. IV, XII–I, 12; A. 13; scales 40. Body villous, the prickles enlarged and tubercle-like along back and lateral line; nasal spines strong; supraocular ridge much elevated, with dermal flaps and 2 blunt spines; 3 pairs of fleshy slips on nasal bones, and 2 on supraocular ridges; smaller cirri on maxillary, on preorbital, and several on lower jaw; interocular space very deeply concave; 2 blunt occipital spines on each side, outside of which are 2 or 3 others; opercle small, with a bony ridge; preopercle with 2 blunt spines, below which are 1 or 2 others; lower jaw slightly projecting; maxillary reaching beyond eye, about ½ head; pectorals nearly reaching anal; highest dorsal spine 1⅔ in length of head, as long as caudal; ventrals reaching halfway to anal. Reddish brown, marbled with darker brown, and much variegated; yellowish below; fins variegated with light and dark. Length 8 inches. Atlantic coast of America, chiefly northward, from New York to Labrador, not rare, common at Woods Hole in October and November; a most remarkable looking fish.

Scorpæna americana. GMELIN, Syst. Nat., 1220. 1788, after "Diable en crapand de Mer d'Amérique" of du Hamel de Monceau, Pêche, III, 2, 93.
Cottus acadian, PENNANT, Arctic Zool., III, 371, Nova Scotia.
Cottus acadian, WALBAUM, Artedi Pisc., 392, 1792, Nova Scotia; Newfoundland.
Cottus hispidus, BLOCH & SCHNEIDER, Syst. Ichth., 63, 1801, New York.
Cottus tripterygius, BLOCH & SCHNEIDER, Syst. Ichth., 63, 1801, Nova Scotia; after PENNANT.
Hemitripterus americanus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 268, 1829; GÜNTHER, Cat., II, 143, 1860; JORDAN & GILBERT, Synopsis, 685, 1883.
Hemitripterus acadianus, STORER, Hist. Fish. Mass., 35, 1867.

2392. HEMITRIPTERUS CAVIFRONS, Lockington.

D. IV, XIV, 13; A. 14; P. 20; V. I, 3; scales 44. Very similar to *Hemitripterus americanus*, but with the upper surface of the head more uneven, the concavity of the interocular area more marked, and the dorsal fin with more spines. Head equaling depth, about 3½ in total length with caudal. Length 16 inches. Coast of Alaska, not common; perhaps not distinct from the preceding. (*cavus*, concave; *frons*, forehead.)

Hemitripterus cavifrons, LOCKINGTON, Proc. Ac. Nat. Sci. Phila. 1880, 233, Kadiak Island, Alaska. (Coll. W. J. Fisher.)

754. SYNCHIRUS, Bean.

Synchirus, BEAN, Proc. U. S. Nat. Mus., XII, 1889, 641 (*gilli*).

Body slender and moderately elongate, resembling that of *Triglops;* covered with thin, tough skin. Lateral line armed with spiny tubercles. Spiny scales in a series along the dorsal base. Head subconical, with moderately pointed snout. Mouth small, very slightly oblique; the rami of the mandible a little concave beneath. Premaxillaries protractile;

jaws with slender, villiform teeth, in bands; teeth on vomer and palatines. Pseudobranchiæ present. Gills 3½, no slit behind the last; gill openings wide, extending above the median line, the membrane free from the isthmus. Suborbital connected by a bony stay with the preopercle, which bears a strong bifid spine at its angle. Pectorals completely united around the breast, the membranes free at the margin. Ventrals distant from the gill opening, the pubic bones being remarkably long, the fins diverging widely, and consisting of a rudimentary spine and 3 rays. Dorsal long, the spinous portion low, with slender spines, and the soft portion twice as long as the spinous. Anal long. Caudal moderately elongate, its middle rays somewhat produced. Genital papilla of male received in a pit in front of anal. Pacific. (*σύν*, together; *χείρ*, hand.)

2393. SYNCHIRUS GILLI, Bean.

Head 3½; depth 5½; Br. 6; D. VIII to IX, 19 to 21; A. 20; V. I, 3; P. 22. Eye about as long as snout, 4 in head. Maxillary extending to about below middle of eye. The interorbital space not quite equal to length of eye; a pair of strong nasal spines; preopercle with a short and very sharp bifid spine; lateral line with about 41 spiny tubercles, and most of the specimens have a single series of spiny scales along the dorsal base; pectorals nearly as long as the head, and extending to about below the fourth ray of the soft dorsal; ventrals nearly under the middle of the pectorals, their length varying greatly; in some specimens scarcely ½ as long as the head; in others as long as postorbital part of head. In some males the anal papilla is ⅔ as long as the ventral fin of the same individual. This papilla can be received into a pit in front of the anal fin. Spinous dorsal beginning over axil of pectoral, length of its base a little greater than postorbital part of head; none of its spines much longer than eye; distance of anal origin from head about ⅔ length of head. Rays of soft dorsal and anal not much longer than dorsal spines. Caudal about ⅔ as long as head, its middle rays somewhat the longest. Color in spirits pale yellowish brown; the sides showing traces of several small, pale blotches, and the caudal and pectoral with a few very small dark blotches, those on the caudal forming interrupted bands; across the back are faint indications of about 5 pale cross bands. Length 2 inches. Barclay Sound, British Columbia. (The species is dedicated to Dr. Theodore Gill, in appreciation of his researches upon the mail-cheeked fishes.)

Synchirus gilli, BEAN, Proc. U. S. Nat. Mus., XII, 1889, 642, Barclay Sound, British Columbia. (Type, No. 41820. Coll. *Albatross*.)

755. ASCELICHTHYS, Jordan & Gilbert.

Ascelichthys, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 264 (*rhodorus*).

Body plump, fusiform, tapering backward, covered with loose smooth skin; head broad, depressed, its upper surface evenly and weakly convex; a hooked preopercular spine; no nasal spines; a supraorbital cirrus; teeth on jaws, vomer, and palatines; no slit behind fourth gill; gill membranes broadly united, free from the isthmus; spinous dorsal low; the spines slender, almost concealed in the membrane; pectorals broad; ventral fins wanting. Small fishes of the rock pools of the North Pacific. (*ἀ-*, privative; *σκέλος*, leg; *ἰχθύς*, fish.)

2394. ASCELICHTHYS RHODORUS, Jordan & Gilbert.

Head 3; depth 5. D. IX, 19; A. 15; P. 16. Head low, rounded anteriorly; maxillary reaching to posterior border of eye. No scales, prickles, or barbels anywhere, except a fringed cirrus over the eye; preopercle with a short, simple, strongly hooked spine; spines directed downward and forward on subopercle and interopercle; lateral line continuous. Dorsal fins connected by membrane, the spines low, weak, nearly uniform; soft dorsal nearly twice as high as spinous; pectorals about reaching vent. Dark olivaceous, sometimes with saddle-like pale blotches; lips rosy; spinous dorsal dusky, edged in life with bright crimson; other fins dusky, edged with paler, the pectoral slightly barred. Length 15 inches. Pacific Coast, Sitka to Cape Mendocino; very abundant among rocks between tide marks at Neah Bay, the only locality where numbers of specimens have been found, one of the most remarkable of the *Cottidæ*. (*ῥόδον*, rose; *ὅρος*, margin.)

Ascelichthys rhodorus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 264, Waadda Island, Neah Bay, near Cape Flattery (Coll. Jordan & Gilbert); JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 811, pl. 84.

756. PSYCHROLUTES, Günther.

(SPINELESS SCULPINS.)

Psychrolutes, GÜNTHER, Cat., III, 516, 1861 (*paradoxus*).

Body tadpole-shaped, tapering from the head to the very slender tail, covered with very loose, naked, movable skin. Head large, depressed, flattish above; snout obtuse, rounded; interocular space very broad, the ocular ridges obsolete; mouth very large; mandible short, little cavernous, its forms broadly U-shaped; maxillary entirely adnate to the skin of the preorbital; jaws with bands of villiform teeth; no teeth on vomer or palatines; no spines or cirri about the head; suborbital stay narrow. Gill membranes united to the isthmus; gills 3½, no slit behind the fourth. Branchiostegals 7. Fins connected; spinous dorsal of short, slender, flexible spines entirely embedded in the skin and not visible without dissection as the spines do not rise above level of the muscles; soft dorsal short, high, the rays close together, the total number 12 to 24; anal low, of 9 rays; caudal separate; pectoral fins long, with a broad, procurrent base. Ventrals I, 3, close together, distinct, the inner edge adnate to the body. Small fishes, very closely allied to *Cottunculus* and *Malacocottus* on the one hand and to the *Liparididæ* on the other, their characters, like those of the latter family, arising from degeneration of the *Cottidæ*. The extension of the lax skin over the spinous dorsal and the bones of the head afford the only tangible diagnostic character of the subfamily

Psychrolutinæ. From the *Liparididæ*, their separate ventrals distinguish them sufficiently. Small shore fishes of the North Pacific; only a single species known. (*ψυχρολουτης*, one who bathes in cold water.)

2395. PSYCHROLUTES PARADOXUS, Günther.

Head 3⅔; depth 4½, equal to head without snout. D. IX, 15 to 17, only 12 rays seen without dissection; A. 12 or 13; V. I, 3; branchiostegals 7. Head large, very broad, tapering suddenly to caudal peduncle. Eye 4¼ in head, a little shorter than snout, a little less than width of interorbital space. Maxillary extending to below middle of eye. Interocular space flat, not concave; jaws equal, the lower ⌒-shaped, its arch not narrowed behind. Pectoral reaching to slightly above origin of anal, 2⅔ in body; ventrals very small, ⅓ length head. Vent about midway between ventral and anal origin, the second dorsal beginning nearly over tip of pectoral; first dorsal entirely buried in the skin, its short, stiffish spines to be found only by dissection. Color light chocolate brown above, with minute spots of dark; whitish below; a pale stripe from eye downward and forward, between 2 dark ones; body with 3 very irregular dark cross bands, the third extending on dorsal and anal, the first 2 largely confluent and all very irregular in form; an oblique dark band on base of caudal. a narrow dark band behind it; pectoral with 2 or 3 cross bands; all fins, except the ventral, with traces of bands. Length 2½ inches. A specimen, 50 mm long, taken by the *Albatross* off St. Paul Island, Bering Sea, in 1896, shows the following characters: Head 2⅗; depth 3. D. IX, 15; A. 13; P. 19; eye 4 in head; width of mouth, from angle to angle, 1½; snout 3⅓; interorbital 3⅕. Body short, broad, thick, tadpole shape, the texture soft like that of a Liparid, especially about the head; the skin is limp and smooth, covered with little soft dermal warts, that of head especially lax, the cheeks tumid and translucent. No trace of spines on head, the bones all thin and weak; nostrils each in a short tube; mouth broad, its cleft chiefly anterior, the jaws equal; teeth very minute, none on vomer or palatines; lower jaw with 8 large open pores. Gill membranes broadly united to the isthmus, the gill opening extending to slightly below base of pectoral. Lateral line obsolete. Dorsals united, with a slight notch between, the first buried in a ridge of skin so that its delicate spines can not be counted from without; second dorsal low, similar to anal, both of them free from the caudal; lower pectoral rays progressively shortened, the longest 1⅕ in head; ventrals moderate, I, 3, reaching vent, 2⅓ in head; caudal rounded. Color creamy white, with blackish cross bands, irregular in form and broken by whitish patches; 5 black spots on lower jaw; top of head blackish; a narrow blotch at shoulder; a wider one across first dorsal; a broad one on second dorsal abruptly broadened on body, then narrowed, extending across anal; an irregular bar at base of caudal; a narrow bar and some spots and streaks on the fin; pectoral with 2 curved bars, the inner concave, the outer convex backward, the two inclosing a rounded pinkish or deep orange area. Alaska to Puget Sound, rather common in water of moderate depth; a remarkable little fish, evidently a degraded Cottoid. Here described from specimens from Unalaska. This species is taken abundantly in shallow water about Kadiak south of the Alaskan Peninsula, thence westward through Unimak Pass, along the northern shore of Unalaska Island to the Kuril Islands, and the Pribilof Islands and in Bristol Bay. The depths range from 38 to 121 fathoms. (*παράδοξος*, unaccountable.)

Psychrolutes paradoxus,* GÜNTHER, Cat., III, 516, 1861, Gulf of Georgia, Vancouver Island (Coll. H. M. S. *Plumper*); JORDAN & GILBERT Synopsis, 687, 1883.

Psychrolutes zebra, BEAN, Proc. U. S. Nat. Mus. 1890, 43, Aleutian Islands, between Unga and Nagai Islands, at Albatross Station 2848, 55° 10′ N., 160° 18′ W., in 110 fathoms; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 811, pl. 85; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 410.

757. GILBERTINA, Jordan & Starks.

Gilbertina, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 810 (*sigolutes*).

This genus differs from *Psychrolutes* chiefly in the long continuous dorsal and anal, the former having 24 rays, the latter 14. Anterior rays of spinous dorsal not bound down by skin of the body, the first apparent ray being nearly above gill opening. Skull extremely soft and cavernous, the long oblique lower jaw especially so. (Named for Dr. Charles Henry Gilbert, "who has contributed more than anyone else to our knowledge of the fishes of the North Pacific.")

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* The following is the original description of *Psychrolutes paradoxus*, Günther:

"Branchiostegals 7; D. 9; A. 9; C. 12; V. 2. Head large, not quite so high as broad, its length being $\frac{2}{7}$ of the total. The snout is obtuse, although considerably longer than the eye, rounded, with the upper profile steeper than the lower. The cleft of the mouth is oblique, of moderate width with the jaws equal anteriorly; a narrow band of minute teeth in the jaws; the palate appears to be smooth. The maxillary, which is widened at its posterior extremity, extends to below the middle of the eye. The nostril is situated very near to the extremity of the snout, and provided with a very short tentacle. The eye is immediately below the upper profile; its diameter is about $\frac{1}{7}$ of the length of the head, $\frac{1}{2}$ of that of the snout, and nearly $\frac{1}{2}$ of the width of the interorbital space. The infraorbital emits a slender process across the cheek, which, however, does not reach to the preopercular margin. None of the opercles are armed; the operculum alone is produced into a flexible short posterior process; the gill opening commences above that process, and is not continuous with that of the other side, the gill membranes being attached to the isthmus. The branchiostegals are exceedingly slender, 7 in number. The body is subcylindrical anteriorly and compressed posteriorly; its greatest depth, behind the head, is $\frac{1}{5}$ of the total length; the skin is perfectly smooth and rather loose. The pectoral is pointed, the upper rays being the longest and extending nearly to the dorsal; the ventrals rather short, close together, situated below the middle of the base of the pectoral, and composed of 2 rays, the inner of which is bifid. Dorsal and anal fins opposite each other, situated far backward on the tail, terminating at some distance from the caudal, and nearly entirely enveloped in skin. Caudal slightly rounded, of moderate length. The vent is situated about midway between the root of the ventral and the origin of the anal. The upper parts are brownish gray, minutely dotted with black, and with 2 very large deep brown blotches of irregular size. The caudal and pectoral fins are dotted and spotted with black.

	Lines.
Total length	21
Length of head	6
Heighth of the body	4

"This fish resembles in its general habit somewhat the genius *Liparis*. Gulf of Georgia (Vancouver Island), voyage of H. M. S. *Plumper*."

Dr. Boulenger says, October 24, 1895: "I have examined the type of *Psychrolutes paradoxus*. I count 12 soft rays, the anterior embedded in the thick skin, so that Dr. Günther's statement is to be accounted for. But there are no spines." Later Dr. Boulenger writes us that he has compared Dr. Günther's type with the figure of *Psychrolutes zebra*, published by Jordan & Starks, and finds that it agrees fully with the latter. There is, therefore, little doubt that the species *zebra* is identical with *paradoxus*.

2396. GILBERTINA SIGOLUTES, Jordan & Starks.

Head 3; depth 4. D. VIII, 18; A. 14; eye 4½ in head; interorbital 2½; maxillary 2⅕; ventrals 2; pectorals 1; caudal 2¼; base of dorsal 1⅗ in length of body; base of anal 3. Body rather slender, robust anteriorly, compressed posteriorly, the greatest breadth and depth at shoulders. Head large, the nape slightly produced; mouth large and broadly rounded, oblique, the jaws about equal, maxillary extending to posterior margin of eye, its end buried under the skin of the cheek; eyes placed high, the interorbital space very wide and slightly convex, its width about 1½ times that of the eye; the posterior end of mandible very prominent, mandible ∩-shaped, its rami approaching each other posteriorly; bones of head cavernous, largely made up of cartilage, the mandible especially so; anterior end of preorbital forming a blunt spine over mouth; process of premaxillary prominent; a couple of blunt projections behind each eye; upper part of shoulder girdle projecting, forming a blunt spine on nape above gill slit, a row of large pores around suborbital ring, and along under part of mandible no opercular spines. Head and body covered with a very loose, naked, movable skin. Dorsal fin continuous, no notch between spines and soft rays, the spines very slender, the first one inserted over end of opercular flap; dorsal spines covered by skin, but even the first visible without dissection as they rise above the general integument of body, the last reaching to base of caudal fin; anal lower than dorsal, its origin midway between base of caudal fin and posterior margin of eye, ending at about the same vertical that dorsal does, but not reaching so far; pectorals long and slender, reaching past front of anal and over halfway between their bases and base of caudal fin, adnate to the body for the anterior third or fourth of their length; ventrals long, not quite reaching to vent, adnate to the body for ½ their length; caudal fin rounded. Color, light olivaceous; body and head with innumerable dark points, giving the fish a dusky appearance; large dark blotch across body at the posterior ends of dorsal and anal, a similar spot under pectoral; head uniform dusky, lighter below; belly white; middle of pectoral dark; dorsals dark; lower fins white. Puget Sound; known from a single small specimen 1½ inches in length. (*σιγή*, quiet; *λούτης*, bather.)

Gilbertina sigolutes,* JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 811, pl. 86, Point Orchard, near Seattle. (Type, No. 3129, L. S. Jr. Univ. Mus. Coll. Edwin C. Starks.)

NOTE.—Remotely allied to the *Cottidæ* is the Old World family *Platycephalidæ*, characterized by the greatly depressed head and body. Its principal genus is characterized as follows:

PLATYCEPHALUS, Bloch & Schneider.

Platycephalus, BLOCH & SCHNEIDER, Syst. Ichth., 58, 1801 (*scaber*).

Head broad, very depressed, more or less armed with spines; body depressed anteriorly, subcylindrical posteriorly, covered with ctenoid scales. Lateral line present. Two dorsal fins, the first spine isolated from the others. Ventrals thoracic, but rather remote from the root of the pectorals; no pectoral appendages. Jaws, vomer, and palatine bones with bands of villiform teeth. Air bladder none; pyloric appendages in moderate numbers. Polynesia and the Australian seas, through all the Indian seas to the eastern coast of Africa. (Günther.) Two species of this genus have been described from American waters, in both cases apparently by error, as no American ichthyologist has found any specimens of either. (*πλατύς*, broad; *κεφαλή*, head.)

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*Misprinted *sigalutes* in the orignal description.

The following are the species in question:

Platycephalus americanus, SAUVAGE, Nouv. Archiv. Mus., 148, pl. 14, fig. 3, 1878, Potomac River.

This specimen, of course, never came from the Potomac River. The following is the substance of Sauvage's description: Head nearly 3½; width of head nearly 2 in its length. No spines at end of snout; a strong spine before eye; rim of orbit armed with spines directed backward, those in front smaller; ridges of vertex slightly prominent, with few spines; cheek with 4 or 5 strong spines; edge of opercle soft; preopercle with 2 spines, the upper a little the longer, about half space between it and eye; maxillary reaching middle of eye; snout 2 in eye; lateral line spiny throughout its whole length; second dorsal spine shorter than third, as long as maxillary. Ventrals inserted far from anal; pectoral a little shorter than snout and eye. Body reddish, deep red at caudal peduncle; second dorsal and anal with 2 oblique bands of yellowish; pectoral with similar band.

Platycephalus angustus, STEINDACHNER, Sitzgber. Akad. Wiss. Wien 1866, 213, taf. 1, fig. 4, Surinam.

This specimen may not have come from Surinam. The following is the substance of Steindachner's description: Head 3½; breadth of head 1⅕ in its length. D. I–VIII, 13; A. 13; scales 108. Eye 7, somewhat greater than breadth of forehead. Caudal with 3 deep, blackish-brown, lengthwise stripes; body with small spots and some larger light-brown spots; 3 brown cross bands on posterior half of body. Numerous little raised ridges on preorbital rim, and a short spine; no tentacles; 2 spines on preopercle, the lower ⅔ eye. Greatest height of first dorsal ⅓ of second or $\frac{5}{13}$ of head. Caudal rounded.

Family CLXXX. RHAMPHOCOTTIDÆ.

Body short, elevated. Head very large, its greatest depth greater than that of the body; skull with 2 strong bony ridges from above the front of the eye, continuous with 2 large occipital ridges, leaving the interorbital space and middle line of the top of the head strongly concave; snout slender, narrow, and abruptly protruding; mouth very narrow, ∩-shaped, its gape longer than wide; teeth villiform, none on the vomer or palatines; gill opening confined to the region above the base of the pectorals, the membranes below completely united to the shoulder girdle and isthmus; apparently no slit behind last gill; a stout, straight, preopercular spine; nasal spines present; no other spines on head. Skin everywhere on head and body firm, immovable, densely covered with stiff, bifid or trifid spinous prickles; spinous dorsal very small; pectoral with procurrent base. North Pacific; a single species known; a small shore fish. The following account of the skeleton of *Rhamphocottus* is given by Mr. Starks: The posterior end of the prominent ridge, which runs backward from the superior orbital rim on each side, is formed by the epiotic process. It ends in the form of a long "occipital spine;" almost directly under it is the short parotic process. The post-temporal is short, wide, and flat; its upper end is attached to the inner side of the epiotic spine, and for the whole length of its anterior edge, to the skull between the epiotic and parotic processes. From its lower inner surface it sends a wide, thin bone, which is firmly fastened to the base of the skull. It bears a backward projecting spine on its lower end, inside of which the supraclavicle is attached. Actinosts large, wide and thin, without an opening between them. Subopercle absent; preopercle large, sending a spine backward; opercle triangular on its lower inner angle; the interopercle is developed and strongly coossified with it; it sends a slender process forward under the preopercle; a projection downward from the posterior end of the articular; suborbital wide, thin, and concavo-convex, its convex surface outward. Skull without basal chamber; vertebræ $10 + 14$.

758. RHAMPHOCOTTUS, Günther.

Rhamphocottus, Günther, Ann. Mag. Nat. Hist., XIV, 1874, 370 (*richardsoni*).

Characters of the genus included above. (*ῥάμφος*, snout; *Cottus.*)

2397. RHAMPHOCOTTUS RICHARDSONI, Günther.

Head 2; depth 2. D. VII, 13; A. 6; P. 14; orbit 6 in head; maxillary 4; snout 3; highest dorsal spine $6\frac{1}{3}$; dorsal ray 4; anal ray 4; pectoral $2\frac{1}{6}$; ventral 2; caudal 3; vertebræ $10+14=24$. Body short, compressed, the back elevated, its greatest depth just in front of spinous dorsal. Head large, as long as rest of body; snout long and narrow; mouth U-shaped, its gape longer than wide; lips thick, their surface broken up into papillæ; maxillary reaching the nasal spine; lower jaw included; teeth in villiform bands on jaws and vomer, none on palatines; eye placed high, its diameter contained twice in the snout, $1\frac{1}{2}$ in the interorbital; a branched dermal flap, as long as pupil, at tip of snout; head with 2 large bony ridges above, continuous with the orbital rim and ending in strong blunt spines at occiput; head deeply concave between these ridges; nasal spine sharp and recurved; a pair of strong spines over the eyes; a sharp spine just above opercle, a blunt one on opercle below flap, and a long sharp one at angle of preopercle, a low bony ridge leading to each of these spines; a long sharp spine on clavicle just behind gill opening; a blunt bony knob at posterior end of mandibles; gill openings extending upward from upper pectoral ray, their length equal to snout. Entire head and body covered with multipointed spines, those on head much smaller than the ones on sides, a few simple spines along cephalic ridges; the first dorsal spine covered with spines, and each dorsal ray with a row on its side; a few spines on the base of the pectoral and anal rays. Dorsal spines very weak, fitting in a groove in back; soft dorsal higher than spinous, the tips of the rays reaching base of caudal fin; anal short, few-rayed, reaching slightly beyond soft dorsal; pectorals pointed, their lower rays entirely free, reaching about to base of third anal ray; ventrals reaching to ends of pectorals, their origin behind lower part of pectoral base a distance equal to length of snout; caudal rounded behind. Body creamy yellow, with conspicuous irregular dark stripes, edged with black, running obliquely across the body; similar stripes radiating from eye in all directions, 1 to end of snout, a triangular 1 downward, 1 running backward and downward to middle of preopercle, then turning upward and running nearly to occipital spine, 2 or 3 short ones above, each of these involving the membrane of eye; 2 or 3 black-bordered dark spots on edge of opercle; a light yellow streak surrounded by black across caudal peduncle, behind which all is bright cherry red to the end of caudal fin; 2 similar spots on base of pectoral; top of head crossed with wavy black-edged dark bars; top of lower jaw black, a line of black spots running along under parts of mandible; fins all bright red, each ray of dorsal with a sharp black spot at its base, a few spots on dorsal spines; anal, pectorals, and ventrals dark at base. Here described from a specimen 3 inches in length, collected in a rock pool on Channel Rocks, near Point Orchard, Puget Sound, by Miss Adella M. Parker, of Seattle. North Pacific, from Sitka to Monterey; scarce, but not infrequent in Puget Sound, at about 2 to 10 fathoms; a most singular fish. (Named for John Richardson, naturalist and explorer.)

Rhamphocottus richardsoni, GÜNTHER, Ann. Mag. Nat. Hist., XIV, 1874, 370, Fort Rupert, Vancouver Island, British America; BEAN, Proc. U. S. Nat. Mus. 1881, 252; JORDAN & GILBERT, Synopsis, 722, 1883; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 813, pl. 87.

Family CLXXXI. AGONIDÆ.*

(THE SEA POACHERS.)

Body angular, commonly 8-angled, the caudal peduncle 6-angled, covered with 8 to 12 longitudinal rows of imbricated, radially striated plates, the anterior edge of each plate overlying the posterior edge of the plate next in front of it; plates spinous or not. Teeth small, even, in villiform bands on jaws, and in most species on vomer and palatines, sometimes wholly obsolete; gills 3½, no slit behind the last; pseudobranchiæ large, extending down the inner side of opercle; gill rakers small; gill membranes united, free, or joined to isthmus; ventral fins thoracic, narrow, their rays I, 2; vent usually close behind ventrals; spinous dorsal large, small, or absent; anal without spines; caudal rounded, about 3 times as long as wide at base, with 10 to 12 long rays; base of pectorals usually broad, the lower rays sometimes produced; all rays of all fins simple; branchiostegal rays 6; myodome (tube of *recti* muscles) with membranaceous roof; basisphenoid absent; post-temporal not bifurcate, continuously articulated with epiotic and pterotic; pyloric cæca few, about 4 to 7; vertebræ numerous, 35 to 50. Fishes of the cold seas, living among rocks or kelp, most of them of small size and fantastic form, not valuable as food. Genera 20; species about 40. The species are extremely varied, and must be placed in very many genera, or else reduced to a single one in each sub-family. The plates vary somewhat in number in all parts of the body in most if not all of the species, although not to the same extent in all the genera. Even the pattern on the breast, which is definite for the species of all the genera except *Hippocephalus*, varies in the different individuals of the same species, so that it is probable that even where no variations are indicated by the numbers given in the following descriptions they would be found by comparing large numbers of individuals. The plates in the dorsal series vary from 1 to 3 in number in most species; they correspond closely with the number of vertebræ, there being usually 1 or 2 fewer of the former than of the latter. It seems probable that the vertebræ vary a little in number within the species, and the rings of plates correspond in number with them at least throughout most of the length of the body. There is no definite proof, though the balance of evidence seems to indicate, that the superior lateral series of plates in *Aspidophoroides*, bearing the lateral line, corresponds with the median lateral series of plates of *Agonus*, etc. In the following descriptions of species, when the diameter of the eye is not specified, the longitudinal diameter is meant. The rays of the fins arise regularly in the intervals between the successive pairs of plates alternating with them, and the membrane behind the last spine of the first dorsal fin ends at variable distances from the base of the spine; hence in giving the number of plates between the dorsals, the number between the last spine and the first ray is meant, unless otherwise stated. "Length of body," as the standard of measurement, means the length from tip of premaxillary to base of caudal, unless "total length" is mentioned. The rostral spines, whether 1 or 2 pairs, belong to the nasal bones, and are properly "nasal spines" in the species in which there is no free terminal plate. The latter, with its spines, may be the freed anterior part of the nasal bones. The hypural bone is included in the number of vertebræ, and these were counted in nearly all cases in only 1 individual. The young of several species have been described, some of them in detail, and so far as known they all differ from the adults in the same way. The spines and ridges are more prominent; the body is relatively shorter, its anterior end abruptly broader, forming with the head a more or less definite rhombic figure; the tail is more compressed; the head is broader, the snout more blunt, and the lower jaw relatively longer; the vent lies farther back from the base of the ventral fins, and there are usually pairs of small plates between them; the dorsal and ventral series of plates on the tail, which are single in the adults of nearly all the species, are double in the young, or at least have the double row of serrations. Nearly all the species are found within the limits assigned to this work. The few not so found are included, for completeness' sake, in footnotes. (F. C.)

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* The account of the *Agonidæ* is contributed by Mr. Frank Cramer, a graduate student in Leland Stanford Jr. University, some additions having been made by Jordan & Evermann.

a. Spinous dorsal present.
b. Gill membranes free from the isthmus.
PERCIDINÆ:
c. Body compressed; lower jaw not projecting; plates of body spinous; first dorsal at nape.
d. Body elongate; dorsals well separated.
e. Teeth on vomer; no occipital spines or barbel on snout. PERCIS, 759.
ee. No teeth on vomer; snout with a long barbel; occipital spines present. AGONOMALUS, 760.
dd. Body short and high; dorsals close together; vomer without teeth; occipital spines present; lower rays of pectorals free. HYPSAGONUS, 761.
BRACHYOPSINÆ:
cc. Body more or less depressed; lower jaw projecting; plates of body spinous or not; first dorsal behind nape.
f. Chin without terminal barbel.
g. Snout short (not produced in form of a tube); plates of body spinous.
h. Bones of snout short, not forming a tubular nose.
i. Vomer and palatines without teeth; breast simply prickly. STELLERINA, 762.
ii. Vomer and palatines with some teeth; breast with large plates. OCCA, 763.
hh. Bones of snout produced into a long tube which bears the short jaws at the end; body rather robust, the plates with spines. BRACHYOPSIS, 764.

ff. A long barbel at tip of chin; snout long (produced into form of a tube, as in *Syngnathidæ*); body subterete, very slender, its plates not spinous. PALLASINA, 765.

AGONINÆ:

bb. Gill membranes joined to isthmus, with or without a narrow free fold behind.

j. Tip of snout without free median plate or spine; mouth inferior, lower jaw short.

k. Vomer without teeth.

l. Lower side of snout with no barbels; one pair of spines on tip of snout. LEPTAGONUS, 766.

ll. Lower side of snout with barbels.

m. Gill membranes without barbels; a pair of complex barbels under tip of snout; 1 pair horizontal and 1 pair recurved spines at tip of snout. Lower jaw very weak; teeth feeble, sometimes wanting; plates of body mostly with spines. PODOTHECUS, 767.

mm. Gill membranes with scattered barbels.

n. Plates of body without prominent spines; no preocular spines. AGONUS, 768.

nn. Plates of body largely spinous; a pair of preocular spines. STELGIS, 769.

kk. Vomer and, often, palatines with teeth.

o. Dorsal fins rather long, the rays shortened behind, the last one attached by membrane to the body; no large life-like spine above eye.

p. Plates on body largely spinous; gill membranes with cirri, 1 or more on each branchiostegal; teeth on palatines; lower jaw short beneath the long snout.* AVERRUNCUS, 770.

pp. Plates on body largely unarmed; no teeth on palatines; gill membranes without cirri. SARRITOR, 771.

oo. Dorsal fins rather short, the rays scarcely shortened behind, the last one not adnate by membrane behind; a large knife-like spine over each eye; plates on body largely spinous; no cirri on gill membranes. XYSTES, 772.

jj. Tip of snout with a free terminal plate or spine; teeth on jaws, vomer, and palatines.

q. Occiput without distinct pit; 2 pairs of occipital spines; dorsal and anal well developed.

r. Lower jaw strongly projecting; lower pectoral rays not much produced; terminal rostral plate with 3 spines. BATHYAGONUS, 773.

rr. Lower jaw not projecting; lower rays of pectorals much produced in adults; anal fin short, of 6 or 8 rays. XENOCHIRUS, 774.

qq. Occiput with a deep pit; occipital spines none, or reduced to mere traces; dorsal and anal very short.

s. Body slender, elongate; tail not compressed. ODONTOPYXIS, 775.

ss. Body short and broad in front; tail compressed teeth. BOTHRAGONUS, 776.

ASPIDOPHOROIDINÆ:

aa. Spinous dorsal absent; body not compressed, its plates not spinous; mouth small, terminal; gill membranes free from the isthmus. ASPIDOPHOROIDES, 777.

759. PERCIS,† Scopoli.

Percis, SCOPOLI, Int. Hist. Nat., 454, 1777 (*japonicus*).
Hippocephalus, SWAINSON, Nat. Hist. Fishes, etc., II, 272, 1839 (*superciliosus*).

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* Jaws subequal in *Agonopsis*, a South American genus very close to *Averruncus*.

† Dr. Gill has called our attention to the identity of *Percis* with *Hippocephalus*.

Body moderately elongate, compressed throughout; back elevated behind nape; 2 rows of strong, curved spines along whole length of each side (spines of the other series smaller); first dorsal fin beginning behind nape; dorsals far apart; anal fin long. Vent far back from base of ventrals. Head narrow anteriorly, abruptly broader behind; mouth terminal; median rostral plate none; nasals united in front of maxillary pedicles. Interorbital space broad, the supraocular ridges very prominent, with large, flat, triangular supraocular spine or shelf; no occipital spines. Teeth on jaws and vomer, none on palatines. Gill membranes united, free from isthmus. North Pacific. (*περκίς*, a synonym of *περκη*, perch.)

2398. PERCIS JAPONICUS* (Pallas).

Head 4$\frac{1}{5}$; Br. 6; D. VI, 7; A. 8; P. 12; V. 3 (I, 2); C. 2–13–2. Body compressed throughout, the shoulder girdles prominent; width of body at base of pectorals a little more than greatest height and 5 in body length. Immediately behind pectorals the width a little less than greatest height; between dorsals and on peduncle it is nearly 2, and under second dorsal a little more than 2 in the height at the same points. Abdomen moderately swollen in front of vent. The back rises at an angle of 45° behind occiput, slopes downward under first dorsal, leaving a hump under its front end, rises in front of second dorsal and slopes downward again under it; ventral outline nearly straight; vent between $\frac{1}{3}$ and $\frac{1}{4}$ distance from ventrals to anal. Breast and area between ventrals and vent almost completely occupied by nearly flat, radially striated plates, with slightly raised centers and of variable size, with innumerable, excessively minute plates scattered among them; vent surrounded by prickles. Plates of ventrolateral series small, beginning as distinct rows of spinous plates about opposite vent, with an imperfect row of smaller spinous plates between them and the vent on each side, and converging toward anal. They pass along sides of anal, remain distinct to about the eighth pair of plates behind anal, and unite in a single median plate with a double spine; from this plate to caudal the rows are again distinct, the plates alternating instead of standing opposite each other; the superior and inferior lateral series begin as distinct rows of spinous plates about opposite middle of first dorsal, diverge to about front of second dorsal, and converge toward base of caudal; the plates elongated vertically, their spines, rising abruptly from their centers, are strong, thick, blunt, curved; about 37 plates in inferior and 35 in superior longitudinal row; between them lies the median lateral series, bearing the lateral line, with a nearly continuous row of 38 or 39 spineless plates from head to caudal (a few of them with small, blunt tubercles) dorsolateral series composed of small, indistinct plates from occiput to beyond middle of first dorsal, where they become larger and spinous; plates of sixth, seventh, eighth, and ninth pairs behind last ray of second dorsal closely approximated, but not forming single median plates; from ninth pair to caudal the plates of the 2 rows alternate as on ventral surface; plates in dorsal series 43 to 45. There are almost complete series of small plates, alternating with the large ones, between the dorso and superior lateral series, between the superior and median lateral, between the median and inferior lateral, and between the inferior and ventro lateral series; this multiplication by intercalation of small plates is evident all over the body. There are no large, but numerous minute, plates in front of and on base of pectorals. Gill membranes posteriorly and medially with several rather weak plates and many minute plates and prickles, anteriorly and laterally with a few small plates; underside of lower jaw with many imperfect plates or strong prickles; weaker prickles along the branchiostegal rays. Head depressed throughout, narrow to posterior border of orbits, behind which it widens rapidly. Depth behind orbits $\frac{7}{9}$, and over opercles $\frac{2}{3}$, of width at same points; orbits large, oval, $4\frac{1}{2}$ in head, far forward; interorbital space a little concave, very broad; at anterior border of orbits wider than the orbit itself, $3\frac{1}{2}$ in head; at posterior border of orbit $2\frac{2}{3}$ in head. Supraorbital ridges expanded into a flat, triangular shelf projecting upward and outward over eye and ending bluntly. Occipital ridges heavy, low, spineless, forming low domes behind; space between them concave. Preorbital with about 2 ridges radiating from the anterior inferior border of orbit, each ending in a short, broad, plate-like blunt spine; supraorbital with a broad, dome-like tubercle; preopercle with a dorsoventrally compressed spine; below this 3 successively smaller blunt spines; cheek below orbit and suborbital with 4 or 5 fairly developed and many minute plates; nasal spines far apart, near tip of snout sharp, nearly upright. A large membraneous nasal tube; a short, flap-like barbel at tip of each maxillary; mucous pores of lower jaw with flap-like borders. Mouth small, terminal; no median rostral plate; maxillary reaching a little beyond front of orbit; angle of jaw prominent, tubercular. Dorsals far apart (about 14 pairs of plates between last spine and first ray; 9 pairs from end of first dorsal membrane to first ray), the first a short distance behind occiput, its spines very rough (like the rays of all the fins), with minute prickles or plates; its leathery membrane also rough; spines 6, transversely broad at base, the fourth longest, 2 in head; base of second dorsal about $1\frac{2}{5}$ in that of first dorsal; rays 7, the third longest, about $1\frac{1}{2}$ in head; distance between dorsals about equal to base of first dorsal; anal beginning about 3 plates in front of second dorsal; rays 8, the fifth longest; the membrane notched, the distal third of the 3 anterior rays exserted, with a narrow border of membrane; caudal rounded, its base about 2 in its length; pectorals close to gill openings, $4\frac{1}{5}$ in length of body, their base about 3 in their length, rays a little exserted; ventrals (male) less than 2 in pectorals, the inner ray longer, 8 in body. Lateral line with about 11 pores on the anterior and about 9 on posterior part of body. Gill membranes united, free from isthmus. Teeth on jaws and vomer; none on palatines. Color, pale brownish or yellowish ("old ivory"); a light-brown cross bar across the back in front of and under first dorsal, narrowing to upper end of base of pectoral; another, of irregular outline, passing downward and forward to posterior side of base of pectoral; a larger one, mostly below the superior lateral series, behind first dorsal; 1 under second dorsal, and 3 on peduncle, the last just in front of base of caudal; dorsal fins dusky, with small darker patches; first dorsal with a pale oblique bar near its base; distal half of caudal dark, its tip edged with lighter; posterior half of anal dusky; pectorals marbled with yellowish and brown, the membrane of the distal third dusky, with paler edge; ventrals pale; 4 or 5 brown spots on nape; a curved band of brown connecting the posterior ends of the occipital ridges, another between the latter and the temporal ridges, and a streak extending backward from posterior border of orbit; brown areas on opercle and preopercle. Length 14½ inches. North Pacific; Kuril Islands (Steller), Gulf of Patience, Island of Saghalien (Tilesius), Okhotsk Sea (Dr. Krause); not known from Japan. Here described from a specimen from Okhotsk Sea in Coll. Cal. Ac. Sci., the only one seen since the time of Pallas and Tilesius. (*japonicus*, from Japan, Japonia, because, according to Steller, it is more common toward the south, i. e., in Japan.)

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* Diagnosis: Body moderately slender, compressed, its width between the dorsals nearly 2 in depth at same place; 2 rows of strong and 2 of weak spines along each side of body, and a median lateral row of spineless plates. Head 4$\frac{1}{5}$. Preopercular spine large, suborbital spine tubercular. Supraocular ridge expanded into a triangular shelf projecting laterally far beyond eye and ending bluntly; no occipital spines. Back elevated behind nape. First dorsal short, beginning at nape. Plates in dorsal series 43 to 45; between dorsals (from last spine to first ray) 14 pairs (9 pairs between end of membrane of first dorsal and first ray of second dorsal. Nasal spines sharp, far apart, at tip of snout. No median rostral plate. Gill membranes united, free from isthmus. Teeth in broad bands on jaws and on vomer; none on palatines. Vent between $\frac{1}{3}$ and $\frac{1}{4}$ distance from ventral to anal. Color (in spirits) "old ivory," with brown patches on sides, 1 under first dorsal, 1 between dorsals, 1 under second dorsal, 2 or 3 on peduncle. B. 6; 1 D. 6; 2 D. 7; A. 8; P. 12; V. 3 (I–2); C. 2–13–2.

Cottus japonicus, PALLAS, Spicilegia Zoologia, VII, 30, pl. 5, figs. 1-3, 1772, dry specimen, Kuril Islands (Coll. G. W. Steller); TILESIUS, Krusenstern's Reise um die Welt, IV, pl. 87, 1813.

Agonus curilicus, TILESIUS, Mém. Acad. St. Petersb., IV, 1811, 416; after PALLAS and STELLER.

Agonus stegophthalmus, TILESIUS, Memoirs Soc. Naturalists, Moscow, II, 219, 1809, Gulf of Patience, Saghalien Island; TILESIUS, Mém. Acad. St. Petersb., IV, 1811, 427, pl. 12; GÜNTHER, Cat., II, 214, 1860.

Aspidophorus lisiza, LACÉPÈDE, Hist. Nat. des Poiss., III, 1802; after PALLAS.

Aspidophorus superciliosus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 215, 1829, Kuril Islands; after PALLAS and TILESIUS.

Percis japonicus, SCOPOLI, Int. Hist. Nat., 454, 1777.

Agonus japonicus, BLOCH & SCHNEIDER, Systema Ichthyologia, 105, 1801.

Phalangistes japonicus, PALLAS, Zoog. Rosso-Asiat., III, 112, 1811.

Hippocephalus superciliosus, SWAINSON, Nat. Hist. Fishes, etc., II, 272, 1839.

Hippocephalus japonicus, JORDAN & GILBERT, Synopsis, 723, 1883; CRAMER, Proc. Cal. Ac. Sci. 1894, 194, with figure.

760. AGONOMALUS, Guichenot.

Agonomalus, GUICHENOT, Mém. Soc. Sci. Nat. de Cherbourg, IX, 1866, 252, pl. 9 (*proboscidalis*).

Head and body strongly compressed, the latter entirely armed with angular osseous plates. Teeth excessively small on both jaws, none on vomer or palatines. Dorsal fins separate; a long, fleshy barbel on tip of snout; mouth small; a very high, broad, somewhat recurved spine or bony projection above each orbit; occipital spines not prominent; origin of first dorsal above nape, the profile from nape to fin very steep; pectoral rays somewhat exserted; gill membranes probably united and free from isthmus. Closely related to *Hypsagonus*. (*Agonus*; ὁμαλός, level, even, or flat; i. e., compressed.)

2399. AGONOMALUS PROBOSCIDALIS (Valenciennes).

Height of body $5\frac{1}{3}$ in total length; greatest width of abdomen $\frac{5}{6}$ of height. Br. 6; D. VIII, 6; A. 12; P. 11; V. 3 (I, 2); C. 2–11–2. Body slender, compressed. Side of body throughout its length with 2 rows of spinous plates, 1 above and 1 below lateral line, the plates oval, radially striated, the spines high, curved, compressed upon middle of plates. Behind pectoral girdle, between first plates of superior and inferior spinous series, a circular striated plate with a small spine; a small spine upon a plate on the pectoral girdle above insertion of pectoral fin. Sides between lateral spinous series a little concave. The rounded, somewhat prominent abdomen with small striated plates armed with low blunt tubercles. Profile of body rising vertically behind nape and under first spine of first dorsal, running in a straight line to second dorsal, rising a little under this fin, and descending gradually to caudal. Inferior profile nearly rectilinear. Head small, compressed, with a thick long median barbel at tip of snout; supraocular ridges high, passing down anterior border of orbit; the supraocular spines large, flat, thin; interorbital space deeply concave, with a small longitudinal ridge; nasal spines present; a pair of occipital spines present; also a suprascapular tubercle; none on opercle, but a large, oblong, compressed spine on preopercle and 1 on suborbital; eye large, circular, 4 in head. The preorbital with ridges, ending at its lower border in strong denticulations. Mouth small; lower jaw shorter than the upper; teeth excessively small; none on palatines. Spines of first dorsal large, curved, and higher than the body beneath them; second dorsal lower, its rays strong and curved; anal very long; caudal narrow and rounded; pectoral very large, its longest rays equal to longest spines of first dorsal; rays simple and rough; ventrals small. Lateral line indicated by a series of small longitudinal "traits" set off on naked space between the 2 longitudinal series of large spinous plates (after Valenciennes). Guichenot says the total length is scarcely $6\frac{2}{5}$ inches (16 cm.). His figure, which seems to be good, furnishes the following facts: About 7 plates of the superior lateral series between the adjacent rays of first and second dorsals, and about 2 between posterior edge of membrane of first dorsal and first ray of second dorsal; 10 plates from last ray of second dorsal to base of caudal. A small but distinct tubercle or spine posteriorly at base of supraocular spine. Occipital spine apparently very close to elevated part of back, but distinct; in front of its base a small but distinct tubercle, as in *Hypsagonus quadricornis*. Spines of first dorsal all exserted, the first for about $\frac{1}{4}$ of its length; all rays of anal exserted, the anterior 3 or 4 for about $\frac{3}{4}$ of their length; posterior anal rays (except the last) longest; all rays of pectoral considerably exserted (about $\frac{1}{5}$ of their length); 27 spinous plates in the series above lateral line, 30 in the series below lateral line. One specimen known, taken in 1 of the coves of the Port of the Emperor Nicolas, Gulf of Tartary (Nicolaevsk, mouth of Amur River, west of the Island of Saghalien). (Guichenot.) (*proboscidalis*, bearing a proboscis; in allusion to the prominent barbel on snout.)

Aspidophorus proboscidalis, VALENCIENNES, Comptes Rendus de l'Acad. des Sciences, XLVII, 1040, 1858, Port of Emperor Nicolas (Nicolaevsk), Gulf of Tartary.
Agonomalus proboscidalis, GUICHENOT, Mém. Soc. Sci. Nat. Cherbourg, 1865, 254, pl. 9; SAUVAGE, Nouv. Arch. Museum Hist. Nat., Paris (2), I, 1878, 157.

761. HYPSAGONUS, Gill.

Hypsagonus, GILL, Proc. Ac. Nat. Sci. Phila. 1861, 259 (*quadricornis*).
Cheiragonus, HERZENSTEIN, Bull. Acad. Imp. Sci. de St. Petersb., XIII, 1890 116, (*gradiens* = *quadricornis*).

Body compressed, elevated, depth greater than length of head, more than $\frac{1}{3}$ of body; head small, separated from first dorsal by a very deep nuchal depression; top of head very uneven, 1 pair of large supraocular and 1 pair of large occipital spines, strong, blunt; mouth terminal, jaws about equal, a large barbel or none at tip of snout; teeth on jaws, none on vomer or palatines; gill membranes united, free from isthmus; scales or plates large, radially striated, with a central spine or tubercle; 2 rows of strong and 2 of weaker spines along side of body; dorsal fin long, high, beginning immediately behind nape, the spines strong, the first serrated; pectorals short, procurrent, the lower 8 or 9 rays free; ventrals small; vent nearly halfway between ventrals and anal. (ὑψι- high; *Agonus*.)

2400. HYPSAGONUS QUADRICORNIS* (Cuvier & Valenciennes).

Br. 6; D. IX to XI (rarely IX, usually X), 6 or 7; A. 9 or 10; P. 13 or 14; V. 3 (I, 2); C. 13; vertebræ $\frac{8}{28}$ (36). Pyloric cæca 5 (2 individuals). Body strongly compressed throughout its length. Abdomen swollen (much less in male than female) about $\frac{7}{10}$ of the depth, the latter 3 to $4\frac{2}{7}$ (usually about 4) in the length; body much narrower under second dorsal, only about $\frac{1}{3}$ of depth. Back rises almost perpendicularly behind the nape, slopes downward to end of first dorsal, rises gently to base of second dorsal, then sinks and rises again to base of caudal; ventral outline gently convex. Plates distributed in general as in the other Agonoids, but with many deviations in detail. Interspaces membranaceous, studded with a variable number of small plates; vent nearly halfway between ventrals and anal, the membrane between it and ventrals with scattered plates; plates of ventrolateral series small, the spines short, blunt, strongest from vent to anal; those of the inferior lateral series elongated vertically, beginning behind middle of base of pectorals, with long, strong, curved spines, which rise abruptly from the center of the plates, growing smaller posteriorly, minute at base of caudal, their number varying from 28 to 30. The series of the lateral line consists of 7 to 9 plates

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*Diagnosis: Body short, much compressed throughout its whole length; its greatest width 3 to $4\frac{2}{7}$ in depth; 2 rows of strong and 2 of weaker spines along side of body; a strong spine above base of pectoral; head $3\frac{1}{2}$; preopercular spine present, large; 1 pair large supraocular and 1 pair large occipital spines, strong and blunt. Body abruptly elevated behind nape; first dorsal long, high, beginning immediately behind nape; 8 or 9 lower rays of pectoral free; plates in dorsal series about 33 to 35; between dorsals about 5; usually a single barbel at tip of snout; no median rostral plate; gill membranes broadly united, free from isthmus; no teeth on vomer or palatines; vent nearly halfway between ventrals and anal. Color, front half of body blackish violet (variable), hinder half pale, yellowish, with 2 or 3 narrow dark bands; caudal with dark band distally.

(sometimes varying on the 2 sides of the same animal), the first 2 (occasionally the first 3) very large, supplying the lack of plates in the superior lateral series anteriorly and sometimes apparently forming a part of this series, their spines long, strong, and curved; remaining 5 or 6 plates distributed at varying distances along side of body, small, but sometimes provided with small spines; the superior lateral series begins under about the seventh spine of first dorsal and runs in a straight line to caudal, the spines a little smaller than those of the inferior lateral series, and vary from 25 to 27 in number (plus the 2 or 3 plates of the lateral line when they appear to belong to this series). The dorsolateral series begins behind occipital spine and follows outline of back close under dorsals, 33 to 35 pairs; plates small, with tubercles or blunt spines. Between the dorsolateral series and the base of each dorsal fin is a supplementary series of very small tuberculated plates or prickles; those under the anterior fin sometimes become apparently continuous with the dorsolateral series, crowding the anterior plates of the latter downward; about 5 pairs between dorsal fins. Behind pectoral, between the inferior lateral series and the large anterior pore plates there are usually 2 or 3 plates, of which 1 or 2 sometimes bear minute spines; 1 plate with a large, strong spine just above base of pectoral; none in front of the fin, which is close to gill opening. No plates on branchiostegal membranes or lower jaw. Head compressed, snout 3½; nearly as wide as high across preopercle, much narrower under orbits. Orbits large, circular, high up, 3 in head. Interorbital space wide behind, much narrower in front, concave; supraorbital ridges high, shelving outward over eye, ending in strong spines directed outward, upward, and a little backward, in front of the base of which there is a very small one, usually in the form of a tubercle of variable size (most distinct in the young). Preorbital with 2 or 3 ridges radiating from anterior inferior border of orbit, its edge scalloped; suborbital with a strong, compressed spine projecting nearly at a right angle; preopercle with a strong, compressed, curved spine, and below it 2 or 3 flattened smaller ones; nasal spines strong, curved, separate, somewhat diverging; 1 or 2 or no plates on lower part of cheek; no median rostral plate. Barbel at tip of snout, above premaxillaries, varying much in length, frequently entirely absent. Mouth small, terminal; maxillary reaching front of orbit. Teeth on jaws; none on vomer or palatines. Angle of jaws prominent, tubercular. Gill membranes broadly united, free from isthmus. First dorsal about 2½ times as long as second, high, its spines strong, nearly upright, the first very, and some of the others somewhat, granulated or beset with prickles; the anterior spines but little exserted; membrane stretched. Second dorsal low, its rays stiff; caudal nearly truncate, its width at base about 1⅔ in length; anal long, beginning under posterior end of first dorsal and ending opposite posterior end of second dorsal; 2 or 3 of the posterior rays (except the last) longest, all the rays much, the anterior more than half, exserted; ventrals of female 8 or 9 in length of body; in male longer, 6 to 7½ in body length. Abdominal region much swollen in female. Lateral line, pores 15 to 19, in pairs, except the first. Vent nearly halfway between ventrals and anal. Color blackish or grayish violet, paler below; breast and belly in front of vent marbled with darker; anterior region to opposite posterior end of first dorsal dark, the dark region limited by a still darker band which runs up on the fin; posterior part of body paler, with narrow dark cross bands, 1 under the anterior and 1 under the posterior part of the second dorsal, both passing down onto the anal; caudal peduncle darker, sometimes with irregular patches more intensely dark; caudal with a dark band at base, and another near distal end, the extreme tip white-edged; rays of anal with black spots near their tips; pectorals indefinitely cross-barred by series of short black streaks on rays; ventrals of both sexes with about 2 narrow bars of black. A variable species, widely diffused. Length 2½ inches. North Pacific; Kamchatka, Bering Sea, and coasts of Alaska, south to Bristol Bay and Puget Sound. (Gilbert.) Here described from specimens taken by Dr. Gilbert (*Albatross* Coll.) about the Aleutian Islands. On these specimens Dr. Gilbert has the following notes:

> Taken north and south of the Aleutian Islands, in the shallow water; also at 1 station in Bristol Bay, in depths from 34 to 56 fathoms. Our specimens agree perfectly with the description of *Hypsagonus* (*Cheiragonus*) *gradiens*, Herzenstein (Bull. Acad. Imp. des Sci. de St. Petersb., XIII, 116, May 29, 1890), described from the Gulf of Avatcha in Kamchatka. Dr. G. A. Boulenger, of the British Museum, has kindly compared one of our specimens with the type of *Aspidophorus quadricornis*, C. & V., and states that they are undoubtedly identical. Body short, much compressed, the head also narrow and compressed, especially above and in front. Nasal spines short and strong, a slender barbel, of varying length, in front of them on middle line of snout. Ocular region abruptly rising above the short, slender snout, the eyes vertical, overarched by the supraorbital rim, which bears posteriorly a strong vertical spine. Interorbital space with a deep median groove and without ridges, the occipital region depressed below the bottom of the groove. No deep pit on occiput, the space being gently concave transversely, bounded laterally by moderate ridges, which bear posteriorly a spine preceded by a lone tubercle. A strong spine at lower inferior border of orbit; a strong spine at upper preopercular angle and 3 smaller ones below it; a strong spine above the base of pectoral, behind and above which on sides are 2 strong spines nearly in line with the upper lateral series of plates; surface of opercles with a few short spinous processes, but without definite spine. Vomer and palatines toothless. Branchiostegal membranes broadly joined, forming a free fold across the isthmus. Mouth narrow, horizontal, terminal, the lower jaw included. Maxillary reaching vertical slightly behind front of orbit, 3¾ in head. Eye large, 3 in head; snout 4; interorbital width over middle of orbit ½ head behind snout. Nape rising very abruptly from occiput to front of dorsal, the outline thence descending to near front of second dorsal when it again ascends. The points of origin of the 2 dorsals are therefore prominent, the profile concave behind them. Body deepest under first dorsal spine, 3⅞ in length. Greatest width of body near ventral outline immediately behind ventral fin, 5⅓ in length. A series of small prickles along base of spinous and anterior portion of soft dorsal, bearing 1 spinule to each ray. Plates all concealed, the spines alone projecting; upper lateral series of plates very small, bearing each a minute spinous point; this series is narrowly separated from base of spinous dorsal, and runs along base of soft dorsal, the 2 series uniting immediately behind the latter, bearing each a pair of diverging spines; lateral series with very strong spines, the largest being the anterior ones of the lower lateral series. The upper lateral series is incomplete anteriorly, ending under the eighth dorsal spine. It is apparently completed by 2 very strong spines, which belong, however, to the series of the lateral line. Ventral series of spines small, running along immediate base of anal fin, the pairs uniting behind the anal, the resulting plates bearing a pair of spines. As in the case of the dorsal series, this union is more or less irregular and incomplete, the corresponding plates sometimes failing to unite, and then either maintaining their opposite position or alternat-

ing. Lateral line with few widely spaced pairs of pores, those of each pair approximated and horizontally instead of vertically placed. The interspaces bear in the posterior part of the body a minute prickle each; in the case of the 2 or 3 anterior pairs, these become very strong spines, nearly on a line with the incomplete upper lateral series of plates. Anus anterior, nearly midway between base of ventrals and front of anal. First dorsal spine vertically over upper axil of pectoral. The fin is rigidly spread in alcoholic specimens; the third and fourth spines are longest and about equal length of snout and eye; interspace between dorsals equaling ½ length of orbit; anal much longer than second dorsal, its first ray under last dorsal spine, its last ray slightly in advance of the last ray of soft dorsal; anal membranes deeply incised, especially anteriorly. Caudal short, rounded; pectoral of 2 distinct divisions, the upper portion consisting of 4 or 5 rays joined by membrane; the lower part of 8 entirely disconnected rays. These upper and lower portions of the fin are used alternately in pushing the fish forward on the bottom, the upper lobe being downward and forward for the purpose. In the aquarium, the fish appears to walk, resting alternately on the upper and lower pectoral rays and on the front rays of the anal; the longest pectoral rays reach to or just beyond front of anal; ventrals short, not reaching vent in females, reaching to or slightly beyond vent in males. D. IX to XI, 6 or 7; A. 9 or 10; P. 13 or 14; V. I, 2; C. 13. Vertebræ 8 + 28. Lateral line 7 to 9. Color; blackish or greyish violet, paler below; breast and belly in front of vent marbled with darker; anterior part of sides, to opposite last dorsal spines dark, the darker region limited by a still darker band which runs up on the fin; posterior part of body paler, usually with 3 darker cross bars, the last of which often broadens out to occupy all of the caudal peduncle; caudal with a dark bar at base and another at posterior margin, the extreme edge white; the dark vertical bars continued onto the anal fin, the rays also spotted with back near tips; ventrals with a black bar or spot at base; sometimes a second on middle of fin; pectorals indefinitely cross-barred, largely pale on basal portion; color varying greatly, the lighter areas on body and fins often with dusky marblings. (Gilbert.) (*quatuor*, four; *cornu*, horn.)

Aspidophorus quadricornis, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 221, 1829, Kamchatka. (Coll. Dr. Collée. Type in British Museum.)
Hypsagonus (*Cheiragonus*) *gradiens*, HERZENSTEIN, Bull. Acad. Imp. des Sci. de St. Petersb., tome XIII, 116, May 29, 1890, Kamchatka, Sinus Awatska, Port Petropaulski.
Agonus quadricornis, GÜNTHER, Cat., II, 215, 1860.
Hypsagonus quadricornis, GILL, Proc. Ac Nat. Sci. Phila., XIII, 1861, 167; JORDAN & GILBERT, Synopsis, 722, 1883; GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 439.

762. STELLERINA, Cramer.

Stellerina, CRAMER, in JORDAN & EVERMANN, Check-List Fishes, 447, 1896 (*xyosternus*).

Body moderately elongate, tapering uniformly from head to caudal, 8-hedral, subterete, a little depressed anteriorly, depth about 7, width about 6 in length; head 4½, tapering but little forward; profile of head and snout in straight line with back. Plates in dorsal series about 35; between occiput and first dorsal 6 or 7 pairs. Plates of body spinous; breast covered with radially striated prickles. Mouth very oblique, the snout short, not tubular, lower jaw protruding, entering profile; teeth small, in few rows on jaws, none on vomer or palatines. A barbel at tip of each maxillary. No median rostral plate. Nasal spines small; no supraocular or occipital spines. Gill membranes united, free from the isthmus. Anal long. (Named for Georg Wilhelm Steller, naturalist and explorer, the first to study the fishes of Bering Sea.)

2401. STELLERINA XYOSTERNA* (Jordan & Gilbert).

B. 6; D. VI or VII–6; A. 8 or 9; P. 17 to 19; V. 3 (I, 2); C. 1, 11, 1; lateral line 36. Body slightly depressed in front, as high as wide under first dorsal, 8-hedral, subterete, the faces but little concave; tail strongly depressed, hexagonal. The sharp, slightly curved spines present on all the plates of each series, but minute on the median, dorsal and ventral plates of caudal peduncle; the superior lateral series beginning opposite front of first dorsal, being replaced anteriorly by the series of the lateral line. Unlike the species of *Phalangistes* (in which there are several), only 1 pair of plates between last ray of second dorsal and first median plate and 1 between last anal ray and first median plate. Breast, unlike that of other species, without plates, but covered with innumerable radially striated prickles; edge of breast in front of lower end of base of pectoral with 3 to 5 plates. Branchiostegal membrane and under side of mandible naked; membrane between the ventrolateral series behind and around vent with minute scattered prickles; 2 or 3 spinous plates in front of pectoral; the inferior lateral series, unlike that of *O. dodecaedron*, running directly toward base of pectoral. Head tapering but little forward, as high as wide, 4½ in length. Orbits moderate, nearly circular, longer than snout, a little more than 3 in head; interorbital space nearly flat, nearly 2 in orbit; supraorbital and occipital ridges but little developed, spineless; temporal ridge moderate; a small suprascapular spine. Cheeks vertical; 2 minute spines at border of preorbital, 1 on suborbital, 2 rather large and sometimes a third small one on preopercle; no plates on lower part of cheek; nasal spines minute, converging behind the maxillary pedicles. Median rostral plate absent; mouth very oblique, lower jaw protruding, entering profile; maxillary nearly reaching pupil, enlarged at tip. Teeth few and small in few rows on jaws; none on vomer or palatines. One barbel at tip of each maxillary. Gill openings large, membranes united, free from isthmus. Dorsals well separated; anal long, beginning under posterior end of first dorsal; caudal about 3 times as long as wide; pectoral 4⅔ in length of body, the base more than 3 in the length, with 17 to 19 rays (19 rays in 1 pectoral of a small specimen, 18 in the other), rounded, the lower rays rapidly shortening; ventrals of female 2 in pectorals, 1⅓ in male; tips of rays exserted. Color, light olive brown, pale below; top of head and back with minute spots and sinuous streaks of darker; lower jaw and lower edge of cheek silvery; pectorals dark, with a broad pale patch below, near base, and a broad pale tip; ventrals pale in both sexes (?); rays of dorsals dark; caudal dark; posterior part of anal dark, as in B. *dodecaëdron*. Length 6½ inches. Coast of California and Oregon, rather rare, south to Monterey. Here described from specimens from coast of Oregon, taken in 24 fathoms. (ξύω, to scrape; *στέρνον*, breast.)

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* Diagnosis: Body moderately elongate, tapering uniformly from head to caudal, 8-hedral. a little depresssd anteriorly, the depth at base of pectorals ⅚ of width, the latter 6 in length; profile of head and snout nearly in a straight line with back; head but little tapering forward, 4½ in body; plates in dorsal series 35; between occiput and first dorsal 6 or 7; between dorsals 4 to 6; from ventrals to anal about 10 pairs. One barbel at tip of maxillary; gill membranes free; median rostral plate wanting; nasal spines small; no supraocular or occipital spines. Color light olive brown, pale below; mandible and lower part of cheek silvery.

Brachyopsis xyosternus, Jordan & Gilbert, Proc. U. S. Nat. Mus., III, July 2, 1880, 152, Santa Cruz, California; (Coll. Dr. C. L. Anderson); Jordan & Gilbert, Synopsis, 727, 1883; Jordan, Cat. Fishes N. A., 113, 1885.

Agonus (*Brachyopsis*) *annæ*, Steindachner, Ichth. Beiträge, IX, 254 (17), pl. 6, figs. 1, 1a, and 1b, Sitzb. der K. Acad. der Wiss., LXXXII, July 15, 1880, San Francisco, California.

763. OCCA, Jordan & Evermann, new genus.

Occa, Jordan & Evermann, new genus (*verrucosus*).

This genus differs from *Brachyopsis* in the short snout which is not tubular, and is formed as in *Stellerina*. From the latter genus it is separated by the large plates on the breast, and by the presence of at least a few teeth on the vomer and palatines. North Pacific. (*occa*, a harrow.)

a. Anal rays 10 to 12; plates of belly bluntly spinous; ventrals pale. VERRUCOSA, 2402.

aa. Anal rays 14 to 16; plates of belly nearly smooth; ventrals dark. DODECAEDRON, 2403.

2402. OCCA VERRUCOSA* (Lockington).

Br. 6; D. VII to IX-7 or 8; A. 11 or 12 (10 or 11, Lockington); P. 14 or 15; V. 3 (I, 2); C. 1, 11, 1; vertebræ 13 + 24 = 37 (37). Pyloric cæca 6 (1 individual); lateral line 36 or 37. Body and tail depressed throughout, the former rounded octagonal, the faces little concave; caudal peduncle hexagonal, short, with about 7 median dorsal and 5 or 6 median ventral plates; the sharp curved spines better developed than in *O. dodecaedron*, present on all ridges from head to caudal, except 2 or 3 plates of median ventral series of peduncle; plates of median lateral (lateral line) series large and bearing small spines from head to near posterior end of second dorsal; 4 or 5 pairs of plates between last ray of second dorsal and first median plate, and 5 pairs between last anal ray and first median plate; about 18 fairly large and tuberculated plates on breast, some of them separated by narrow intervals of membrane with numerous prickles. Branchiostegal membrane naked posteriorly. Under side of mandible and anterolateral parts of branchiostegal membrane with minute plates or prickles; 3 or 4 large spinous plates in front of, and a number of small plates and prickles on base of pectoral fin; the ventrolateral series separated, from ventrals nearly to anal, by membrane studded with 6 or 8 small striated plates behind and a few around vent; the latter a little farther than usual from base of ventrals (as in *O. dodecaedron*). Top of head, dorsal, and 2 adjacent faces of body granulated; space behind pectoral as far back as its tip naked. Head depressed, elongate, broad behind, its depth ¾ of its width, the latter about 6 in length of body. Orbits large, oval, the longitudinal diameter longer than snout, 3½ in head. Interorbital space wide, nearly equal to orbit, flat between supraocular ridges; the latter spineless, turning out almost at right angles, forming a thin saw-like transverse ridge along

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[*] Diagnosis: Body moderately elongate, tapering, 8-hedral, depressed; depth about ¾ width, the latter 6 in length; head broad, much depressed, tapering by concave outlines to a blunt snout, 4⅝ in length of body. Plates in dorsal series 35 or 36; between occiput and first dorsal, 7; between dorsals, 4; from ventral to anal, 10 or 11 pairs. One barbel at tip of each maxillary; gill membranes united, free from isthmus. Median rostral plate wanting; nasal spines minute; no supraocular or occipital spines. Olivaceous, banded with darker; pectorals with 3 or 4 black areas.

posterior border of orbit; occipital ridges spineless, temporal ridge broken into 2 or 3 tubercles, sometimes ending in a small suprascapular spine. Cheeks nearly vertical, the suborbital ridge but slightly developed; usually a spine at lower border of orbit, 3 or 4 small ones on inferior border of preorbital, a moderate one on suborbital, a rather large one, and beneath it, a smaller one on the preopercle; 3 or 4 moderately developed plates, or as many smaller ones with numerous minute plates or prickles, on cheek below ridge; nasal spines minute, converging behind maxillary pedicles; median rostral plate absent. Mouth oblique, a little less so than in *O. dodecaëdron*, the lower jaw protruding; maxillary reaches to opposite front of pupil. Teeth present on jaws, few and small on vomer, few or none on palatines. One barbel at tip of each maxillary. Dorsals long, moderately separated; anal long, beginning under posterior end of first dorsal; pectorals 4½ in length of body, their width at base 3 in their length, are rounded, the lowermost rays rapidly shortening; ventrals of female a little less than 2 in pectorals, those of male much longer, reaching beyond front of anal, longer than pectorals; the membrane broad. Caudal 3 times as long as wide at base. Color dark grayish or brownish, pale below; the young with distinct cross bars, a broad one in front of first dorsal, 1 under the front end and 1 behind middle of first dorsal, 1 between dorsals, 1 under second dorsal, and 2 on peduncle; bars indistinct in adults; dorsals dusky, faintly barred with darker, caudal dark; anal dark on membrane, white-edged (dark only on posterior end in young, as in *O. dodecaëdron*); pectorals washed with orange, 2 dark blotches near base, the terminal part with 2 (sometimes confluent) or 1 large dark patch (these patches in the young appearing as partially confluent bars, more like *O. dodecaëdron*); ventrals of female pale, of male bright orange yellow, with a large black spot inside of first ray and 2 small ones at tip. Length 8 inches. Coast of California and Oregon, south to San Francisco, in 11 to 36 fathoms. Here described from specimens from off the Oregon coast. (*verrucosus*, warty.)

Brachyopsis verrucosus, LOCKINGTON, Proc. U. S. Nat. Mus., III, May 6, 1880, 60, Drakes Bay, near San Francisco, California; JORDAN & GILBERT, Synopsis, 726, 1883; JORDAN, Cat. Fishes N. A., 114, 1885.

Agonus (*Brachyopsis*) *barkani*, STEINDACHNER, Ichth. Beiträge, IX, 253 (16), pl. 5, Sitzb. der k. Akad. der Wiss., LXXXII, July 15, 1880, San Francisco, California.

2403. OCCA DODECAEDRON* (Tilesius).

Br. 6; D. IX or X, 7 or 8; A. 14 to 16; P. 14 or 15; V. 3 (I, 2); C. 1, 11, 1; vertebræ 13 + 26 = 39. Pyloric cæca 5 (1 individual). Lateral line with 37 or 38 pores. Body as far as middle of first dorsal depressed, becoming gradually compressed behind. Caudal peduncle short, 5 to 7 dorsal and

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* Diagnosis: Body moderately elongate, tapering nearly uniformly from head to caudal, depressed, 8-hedral; peduncle 6-hedral, compressed posteriorly; depth of body ⅔ of width, the latter at base of pectorals 6 in length. Head broad, much depressed, 4½. Plates in dorsal series 40; between occiput and first dorsal 8 or 9; between dorsals 3 to 5; from ventrals to anal 13 to 15 pairs. One barbel at tip of each maxillary; gill membranes free. Median rostral plate wanting; nasal spines minute, usually absent; no supraocular or occipital spines. Brownish olivaceous, with several indistinct cross bars; dorsal fins with 2 black bars.

3 or 4 ventral median plates, compressed, hexagonal. Short blunt spines present on the dorsolateral series from a little in front of first dorsal to middle of second dorsal, none on median dorsal plates of peduncle; sharper spines on the superior lateral series from near head to near caudal; the very low ridges of the inferior lateral and ventrolateral series bear a few spines near middle of body; plates of the median lateral (lateral line) series nearly as large as those of the adjoining series, about a dozen of the most anterior bearing small spines; 5 or 6 pairs of plates between last ray of second dorsal and first median plate, and about 5 pairs between last anal ray and first median plate; a strong sinuous ridge of plates from lower end of base of pectoral to isthmus; a small median ridge on breast, of 2 small plates in front of bases of ventrals, followed anteriorly by a median series of 3 or 4 larger single plates; between this and the edge the breast is covered with small, thin, distinct plates with numerous small tubercles interspersed; the branchiostegal membrane posteriorly and medially and anterolaterally covered with small plates and prickles; whole underside of mandible with small plates and some prickles or tubercles; 4 or 5 large plates in front of, and a number of minute plates or prickles on base of pectoral fin. Membrane behind and around vent and between vent and ventrals with a variable number of small plates, but mostly with numerous prickles or tubercles. Vent a little farther removed from base of ventrals than usual in the Agonoids. An elongate triangular space behind pectoral, between the inferior and ventrolateral series, naked. Top of head, median dorsal, and 2 adjacent faces of body granulated. Head much depressed, broad behind, tapering, its depth $\frac{2}{3}$ its width, the latter about 6 in length of body. Orbits small, nearly circular, the longitudinal diameter a little more than 4 in head; interorbital space concave, wide, equal to snout, nearly equal to orbit; supraocular, occipital, and temporal ridges low, spineless; cheeks nearly vertical, suborbital ridge hardly developed, spineless; a large, heavy tubercle or spine projecting from preopercle at an angle of 45°; below this 1 or 2 flat small ones; no plates on cheeks; mouth very oblique, maxillary reaching front of pupil; teeth in bands on jaws, vomer, and palatines. Dorsals long, their membranes sometimes continuous; anal very long, beginning a little behind middle of first dorsal; pectorals a little more than 4 in length of body, their base $3\frac{1}{2}$ in their length, with 14 or 15 graduated rays (a few of the uppermost shorter); ventrals of female about $\frac{7}{10}$ those of male; the latter less than 2 in pectorals, about $\frac{5}{9}$ of head; caudal 3 times as long as wide at base. Color brownish olivaceous, pale below; a much-interrupted, indefinite dark band from angle of mouth, under orbit, across preopercles, above pectorals, and along lateral line; a few indistinct cross bars on back; dorsals with a broad dark band along the edge and a parallel one across the middle, otherwise white; caudal dusky; anal dusky near the posterior end; pectorals transversely barred by about 6 series of black points or short streaks on rays; ventrals pale in female, the membrane black in male; head and lips with numerous minute black spots and streaks. North Pacific, Kamchatka, south to Bristol Bay, coast of Alaska, in 10 to 15 fathoms. (Gilbert.) Here

described from specimens from Bristol Bay. (δωδεκάεδρος, having 12 surfaces or sides.)

On these specimens Dr. Gilbert has the following notes:

"A few specimens taken in Bristol Bay in 4½ to 14 fathoms. In males the colors are much brighter than in females, recalling *O. verrucosa*. The bars on dorsal fins are, in males, intense black and bright white, instead of olive brown and whitish as in females; males show also a larger black patch on last anal rays, and have the interradial membrane of ventral jet-black; in none of our specimens does the caudal fin show transverse lines of brown points, as described by Cuvier; in both males and females the caudal is dusky or black, the median rays lighter, the outer ones white. D. IX or X, 7 or 8; A. 14 to 16." (δώδεκα, twelve; ἕδρα, surface, side.)

Agonus dodecaëdron, TILESIUS, Mém. Acad. Petersb., IV, pl. 13, 1810, Kamchatka (Coll. W. T. Tilesius); GÜNTHER, Cat., II, 214, 1860.

Phalangistes loricatus, PALLAS, Zoog. Rosso-Asiat., III, 114, taf. 19, 1811, Kamchatka.

Aspidophorus dodecaëdrus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 209, 1829.

Brachyopsis dodecaëdrus, JORDAN & GILBERT, Synopsis, 723, 1883.

764. BRACHYOPSIS, Gill.

Brachyopsis, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167, 259 (*rostratus*).

Siphagonus, STEINDACHNER, Ichth. Beiträge, V, 140, Sitzb. Acad. Wiss. Wien. LXXIV, July, 1876 (*segaliensis*).

Body moderately elongate, tapering nearly uniformly from head to caudal; depressed, 8-hedral (6-hedral on peduncle); depth about 8, width about 6 in length; head broad, depressed, about 4½ to 5 in standard length. Snout long, almost tubular, bearing the short jaws at the end. Plates in dorsal series about 35 to 40 or more; a barbel at tip of each maxillary; median rostral plate none; nasal spines minute or absent; supraocular and occipital spines none; gill membranes united, free from isthmus; anal fin long, with 12 or 13 rays, first dorsal usually long; mouth oblique, lower jaw projecting; teeth present on jaws, vomer, and palatines; at least some of the plates on body spinous; plates on breast usually with interspersed small prickles or tubercles. (βραχύς, short; ὄψις, face.)

a. Anal rays 13; dorsal spines 8; body fusiform, broad at the breast, the tail very slender. ROSTRATUS, 2404.

aa. Anal rays 12; body slender; eye behind middle of head; 2 spines on suborbital. SEGALIENSIS, 2405.

2404. BRACHYOPSIS ROSTRATUS * (Tilesius).

Br. 6; D VIII, 8; A. 13; C. 10; P. 14; V, I, 2. Body more elongate than in *Agonus cataphractus*, the tail very slender, the body distinctly fusiform, widest between pectorals; mouth short oblique, the maxillary not reaching to below eye; profile straight, cranium flat above, the eyes prominent; no spines on the orbit; preopercle with 3 spines on its vertical margin; 2 on the lower border of the large suborbital; trunk 8-angled; tail 6-angled. Plates more numerous than in *Agonus*, 40 on each upper range from nape to point of their union; numbers in the other rows in proportion; upper series with their ridges rather sharp, lower with obtuse ridges; 2 series of abdomen separated by dilatable skin; no barbels on gill membranes. Pectorals longer and dorsals farther back than in *O. dodecaedron* or *Podothecus acipenserinus*. Lower rays of pectoral larger than the others; anal longer than second dorsal, beginning under middle of first dorsal; length 10 inches. (Tilesius, as quoted by Cuvier & Valenciennes.) The figure of Tilesins shows a tubular compressed snout, with the short mouth at the end and a very wide back, mesially concave. Specimens from Petropaulski have the eye $2\frac{1}{5}$ in snout; mandible $2\frac{1}{8}$ in head; maxillary $4\frac{3}{5}$; snout 3; pectoral nearly as long as head; breast with large plates in 3 dividing rows, with smaller ones between. Tail very slender, not spinous; body chubby, the greatest width $2\frac{1}{4}$, greatest depth $2\frac{1}{3}$ in head; head nearly 5 in body. Scales 44. Teeth minute. The species is intermediate in form between *Occa dodecaedron* and *Pallasina barbata*. Several specimens from Shana Bay, Iturup Island, show the following characters: Dorsal face wider than in either and deeply concave; snout elongate, depressed, its width taken at middle of its length $\frac{1}{2}$ greater than its depth at same point, and $\frac{1}{2}$ its length, measured from tip of lower jaw; lower jaw much longer than upper, the symphysis entering upper profile of snout, vertically furrowed at tip; maxillary not reaching orbit, 4 in head; preorbital elongate, with a lengthwise ridge which divides anteriorly, the branches not terminating in spines, the edge of preorbital entire; anterior nostril in a short tube. Teeth all minute, present on jaws and vomer, often absent on palatines, sometimes present in a small patch on extreme anterior end. Suborbital stay without spine, forming a gibbous striated protuberance on middle of cheek, between which and the horizontal edge of preopercle is a series of three or four small plates; 2 strong diverging spines at angle of preopercle; a shorter spine below them; orbital margins elevated superiorly and posteriorly; interorbital space very narrow, grooved and longitudinally striated, its width equalling $\frac{1}{2}$ diameter of orbit, which is 6 in head; no spines on top of head, the ridges low and rounded. Head $4\frac{3}{5}$ to $4\frac{5}{6}$ in length; width of body $8\frac{1}{5}$ to $8\frac{1}{2}$; length of caudal peduncle $3\frac{1}{2}$ to 4. Body anteriorly hexagonal, the upper lateral ridge becoming obselete immediately in front of spinous dorsal; lower lateral ridge also becoming rounded and obsolescent anteriorly; dorsal face widening rapidly from occiput to front of spinous dorsal where its width equals snout; it gradually narrows posteriorly, the dorsal ridges becoming confluent at a point much nearer base of caudal than end of second dorsal; ventral ridges spineless, the lateral ridges with short spinous points, often distinguishable with difficulty; dorsal series anteriorly with stronger spines which rapidly diminish posteriorly; branchiostegal and gular membranes without plates; plates on body without the minute prickles so characteristic of *Occa verrucosa* and *O. dodecaedron;* breast covered with polygonal plates, a series elevated to form a median ridge, the marginal plates also prominent; prepectoral area wide, with 4 prominent plates, the uppermost bearing a short spine posteriorly; in the dorsal series of plates, 10 lie in advance of first dorsal, 11 between origins of first and second dorsals, 9 or 10 along base of second dorsal. 6 to 9 between second dorsal and the point of confluence of the dorsal series, and 5 to 7 between the latter point and base of caudal; total number of plates in dorsal series 43 to 45, in 6 specimens examined. Pectorals long and narrow, 1¼ in head; dorsal with 8 (rarely 9) spines and 8 soft rays; anal with 13 (rarely 14) rays; pectoral with 14 rays. Color dusky above, marked with small black spots and lines; white below, growing dusky posteriorly; caudal blackish; ventrals white; anal white, with the last rays dusky; dorsals and pectorals with the rays finely dotted with black. North Pacific, recorded from Saghalien, Gulf of Aniva, Petropaulski, and the Kuril Islands. (*rostratus*, pertaining to the *rostrum* or snout; "not because it has a beak, but because its head and snout are more contracted than in the others.")

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* Diagnosis. Lateral line 36. Body more fusiform than in other species of this genus, very robust in front of the middle, tapering to the slender tail. Head triangular and pointed, as seen from above, the mouth quite narrow; eyes small, well forward; head considerably depressed, snout without spine; a short flap at angle of mouth; scales not very rough; gill membranes free from isthmus; ventrals quite short; breast with a median row of raised convex plates; a row of similar plates bordering edge of gill opening, the three series forming a Λ-shaped figure, the interstices filled with very small plates. This diagnosis from Bering Sea specimens obtained by Dr. Bean. (Jordan & Gilbert.)

Agonus rostratus, TILESIUS, Mém. Acad. Petersb., IV, 1810, pl. 14, Saghalien, Gulf of Aniva. (Coll. Tilesius.)

Phalangistes fusiformis, PALLAS, Zoog. Rosso-Asiat., III, 116, 1811, Saghalien, Gulf of Aniva; Kuril Islands. (Coll. Steller & Merk.)

Agonus rostratus, GÜNTHER, Cat., II, 214, 1860.

Aspidophorus rostratus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 212, 1829.

Brachyopsis rostratus, JORDAN & GILBERT, Synopsis, 726, 1883; JORDAN, Cat. Fishes N. A., 113, 1885.

2405. BRACHYOPSIS SEGALIENSIS (Tilesius).

D. VII, 8; A. 12; C. 10; P. 14; V. I, 2. Form resembling *Brachyopsis rostratus,* but the tail shorter; body depressed; eye behind middle of head; 2 spines on suborbital, and some others about eyes; dorsals contiguous; anal longer than second dorsal; pectorals large; no barbels under throat; gill membranes and barbels at chin undescribed, probably as in *Brachyopsis rostratus.* Yellowish brown; fins with black bands. Length 7 inches. Island of Saghalien. (Cuvier & Valenciennes.) Not seen by recent writers. (Name from Saghalien.)

Syngnathus segaliensis, TILESIUS, Mém. Soc. Imp. Nat. de Moscow, II, 216, pl. 14, 1810, Bay of Patience, Saghalien. (Coll. Krusenstern.)

Siphagonus segaliensis, STEINDACHNER, Ichth. Beiträge, V, 140, and Sitzb. der k. Acad. der Wiss., LXXIV., 1876; JORDAN & GILBERT, Synopsis, 723, 1883.

Agonus lævigatus, TILESIUS. Mém. Acad. Petersb., IV, 436, 1810, Saghalien; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 214, 1829.

Phalangistes lævigatus, PALLAS, Zoog. Rosso-Asiat., III, 116, 1811.

765. PALLASINA,* Cramer.

Pallasina, CRAMER, Proc. Cal. Ac. Sci. 1895, 815 (*barbata*).

Form of *Syngnathus* or *Siphostoma;* body slender, depressed; 4-hedral anteriorly, 8-hedral under dorsals; 6-hedral on peduncle; snout produced in a tube; lower jaw projecting beyond upper, turned upward at tip, a long barbel at the symphysis; teeth on jaws and vomer, a single row on palatines; gill membranes free from isthmus, united; both dorsals present; ventrals very short; plates of body slightly keeled, without spines; vertebræ about 45. (Named for Petrus Simon Pallas, naturalist and explorer, the accomplished author of Zoographia Rosso-Asiatica, 1811.)

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* The genus *Siphagonus*, Steindachner, was expressly based on *Agonus segaliensis*. The name can not be used for this group.

a. Three plates in front of ventrals; barbel long. BARBATA, 2406.
aa. Two plates in front of ventrals; barbel short. AIX, 2407.

2406. PALLASINA BARBATA (Steindachner).

Br. 5; D. VI to IX, 7; A. 9 to 12; P. 12; V. 3 (I, 2); C. 11; lateral line 45 or 46; vertebræ $15 + 30 = 45$. Pyloric cæca 6 (1 individual). Body slightly depressed in front, depth at base of pectorals $\frac{5}{6}$ or $\frac{6}{7}$ of width, slender, width about 11 in length. Ridges of the dorso and ventro lateral series strong, the dorsal and lateral halves of the plates form a right angle; no ridge on the inferior lateral row and the plates of the superior lateral row absent anteriorly, so that the body is 4-hedral in front of first dorsal, with dorsal and ventral faces flat or a little concave and the lateral convex. Under first dorsal, the superior lateral series begins with keeled plates, the ridge of the inferior lateral series becoming more prominent, so that under the dorsals the body is 8-hedral; dorsal and ventral faces grooved, and depth equaling length. Caudal peduncle strongly depressed, nearly 4-hedral (median dorsal and ventral ridges extremely low); 45 or 46 plates in the dorsal series, 4 pairs between dorsals, 12 to 13 pairs from ventrals to anal, 5 to 9 pairs between last ray of second dorsal and first median ventral plate; 3 or 4 large plates in a median longitudinal row on breast, with about 1 row of 4 or 5 small ones between it and the series forming the edge of breast; plates radially striated and a little elevated at the center; none between ventrals and vent. Membrane behind vent without plates (or as many as 19, Steindachner's excellent figure). Branchiostegal membrane naked posteriorly, 2 or 3 plates anterolaterally. Narrow nude surface of lower jaw with a series of several plates; 2 or 3 plates in front of pectoral. Head very long and narrow, gently tapering, nearly as high as wide. Orbits nearly circular, the longitudinal diameter about 5½ in head and 2 in snout. Interorbital space moderately concave, nearly 2 in orbit. Supraocular ridges moderate, occipital ridges scarcely defined, temporal ridges moderate, all spineless; no suborbital ridge; suborbital bone spineless; a sharp spine at posterior angle of preopercle and 2 smaller flat ones below this; a longitudinal series of 4 or 5 poorly developed plates on lower part of cheek, between the long horizontal limb of preopercle and orbit. Snout long, tubular, about 2½ in head. Frontal bones much elongated forward, an additional bony plate in front of preorbital and overhanging the maxillary; several small plates in membranaceous interval between preorbital and frontal in front of orbit. Posterior inferior angle of maxillary produced backward, reaching a little more than halfway to orbit. Median rostral plate absent. Lower jaw long, curved upward in front, projecting beyond the upper and entering profile; mouth oblique. Teeth in narrow bands on jaws and vomer, about 1 row on palatines (Steindachner apparently saw none on palatines). A single barbel of variable length (sometimes twice as long as, sometimes less than diameter of orbit) at tip of lower jaw. Gill membranes united behind, free from isthmus. First dorsal with 12 pairs of plates between it and the occiput; anal long, beginning under middle of first dorsal; caudal about 3 times as long as wide at base; pectorals long, 5$\frac{2}{7}$ to 5$\frac{5}{7}$ in body, width at their base about 4 in their length; ventrals about 3 in pectorals and 4 in head in female, 2 in pectorals and 2$\frac{2}{3}$ in head in male. Color reddish or grayish brown with innumerable minute black spots; ventral surface pale, from front of anal to caudal progressively darker with minute black spots; a dark band extends along the side of snout, across orbit and preopercle, and along the side of body, dying out posteriorly; anterior dorsal dusky, darker behind; second dorsal indefinitely cross-banded with short streaks of darker on rays; caudal dusky; pectoral pale, indefinitely banded with short streaks of darker on rays; ventrals pale in both sexes; anal pale. Vertebral column (of a single specimen) with 15 abdominal and 30 caudal (including hypural) vertebræ. North Pacific, south to Japan and Oregon. The specimens here described from Bristol Bay (Coll. *Albatross*); Japan (Steindachner); Arctic Ocean near Bering Strait (W. J. Fisher, Steindachner); Bering Sea, Bristol Bay * (Gilbert); (Tareinsky Bay (Barrett-Hamilton); Port Clarence, Alaska (Scofield).† A variable species. Length of longest specimen examined by us 5$\frac{1}{2}$ inches. (*barbatus*, provided with a barbel.)

Siphagonus barbatus, STEINDACHNER, Ichth. Beiträge, V, 140, taf. 5, Sitzb. der k. Acad. der Wiss., LXXIV, July, 1876; JORDAN & GILBERT, Synopsis, 725, 1883; JORDAN, Cat., 113 1885.

2407. PALLASINA AIX, Starks.

Head from tip of snout, 4 in body; depth 3$\frac{1}{2}$ in head. D. VII, 7; A. 11; P. 11; eye 5$\frac{1}{3}$ in head. Mouth rather oblique, the lower jaw much project-

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* Dr. Gilbert notes specimens from numerous stations in Bristol Bay in 4$\frac{1}{2}$ to 70 fathoms. The dark band on sides is often very strongly marked; the barbel varies much in length. D. VII to VIII, 6 to 8; A. 9 to 12.

† Mr. Scofield gives the following note on 6 specimens taken at Port Clarence, Alaska, averaging about 6 inches in length. We have compared them with specimens of *P. barbata* from Bristol Bay, Alaska, and find our specimens have a much longer barbel and slightly longer pectorals. In all other points they appear to be the same. The barbel is $\frac{1}{3}$ distance from tip of lower jaw to edge of gill membrane. The 2 dorsals vary in their distance from each other. In 1 specimen they touch, in the others they vary in distance the width of 1 or 2 plates. Following is the fin formula of the specimens. These specimens show a sexual difference. The females have shorter ventrals and a lower smaller first dorsal than the males. The first dorsal, too, is without color. The males have larger ventral fins and a large darkly colored first dorsal:

Dorsal.	Anal.	Pectoral.	Sex.	Remarks.
V, 7	10	12	♀	
VIII, 7	10	12	♂	
VI, 7	8	12	♀	The anal injured.
VII, 7	9	12	♂	
VIII, 6	10	12	♂	
V, 6	10	13	♀	

ing; upper edge of maxillary slipping under preorbital for its whole length, its posterior end midway between tip of snout and middle of eye; villiform teeth on jaws and vomer, none apparently on palatines; lower jaw with a fleshy tip, scarcely produced into a barbel, scarcely as long as diameter of pupil; supraorbital rim prominent, making the interorbital space deeply concave; width of the latter about $\frac{2}{3}$ eye; 2 ridges from the inner edges of supraorbital rim run backward, and are continuous with dorsal ridges of body; edge of preopercle with 3 spines, the middle one the largest. Two large median plates in front of ventrals on breast, a row of plates along each lateral ridge of breast, a large plate on each side of the union between first and second median plates, and behind them a row of small plates irregular in size and position, sometimes continuous and interposed between median and lateral plates, and sometimes allowing the edges of median and lateral plates to touch; 11 or 12 plates in front of dorsal; spinous dorsal on 9 or 10 plates, counting to end of membrane; lateral line 43. Space between dorsal ridges strongly concave, the ridges coming together on caudal peduncle, but not uniting, continuing parallel for a short distance and then becoming obsolete; upper lateral ridge ending anteriorly on about the twelfth plate from head. Last rays of dorsal and anal connected to the body by a membrane; space between dorsals about equal to the width of a plate; front of anal midway between posterior end of maxillary and base of caudal; pectoral reaching just past front of spinous dorsal; vent distant an eye's diameter from base of ventrals; length of caudal equal to head behind anterior ridge of pupil. Color blackish, with fine punctulations; belly white; a light streak running backward from eye to upper edge of gill opening; below this an area scarcely so wide as eye, darker than the rest of body, its lower edge sharply defined against the white under parts of head; chin black; dorsals and caudal dusky; pectorals light, the rays with many black spots which do not involve the membrane; ventrals and anal white. This species differs from *Pallasina barbata* in having a much shorter barbel on chin, in having 2 median plates in front of ventrals in place of 3, and in having the plates between the median and lateral plates much smaller and less regular in arrangement. In *P. barbata* these plates are about as large as the median plates and always interposed between them and lateral plates, the arrangement being constant. The abdominal ridges are generally closer together in *P. aix* than in the northern species. Puget Sound to the Aleutian* Islands; taken with the seine in great abundance in Puget Sound, near Port Ludlow; the largest nearly 5 inches in length, the others about 3. (αἴξ, a goat, from the pointed beard, or ἄιξ, a darter, from the slender form.)

Pallasina aix, STARKS, Proc. Cal. Ac. Sci. 1896, 558, pl. 75, Puget Sound, near Port Ludlow, Washington. (Type, No. 5040, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

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* Two small specimens were taken by Dr. Gilbert at Chignik Bay, Alaska. Concerning these he remarks: "We have compared these specimens with the types of *Pallasina aix* and can find no good differences. One of our specimens has 3 median plates in the front of the ventrals, the other 2. (Our specimens of *P. barbata* have either 3 or 2 median plates in front of the ventrals.) A few of the types have 12 pectoral rays, but the majority have 11. Fin formula: D. VII, 6; A. 10; P. 12. D. VII, 6; A. 9; P. 12."

766. LEPTAGONUS, Gill.

Leptagonus, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167, 259 (*spinosissimus*=*decagonus*).

Body tapering, depressed; head about 5⅓; depth 7½ to 9; width 6½ to 8 in total length. Plates in dorsal series 40 to 44; 5 to 6 pairs between occiput and first dorsal; both dorsals present; mouth inferior, snout much projecting; teeth on both jaws, probably none on vomer or palatines; 5 pairs of barbels about mouth; none under tip of snout; 1 pair of recurved spines at tip of snout; 1 pair of supraocular and 1 pair of occipital spines. Gill membranes joined to isthmus. (λεπτός, slender; *Agonus*.)

2408. LEPTOGONUS DECAGONUS* (Bloch & Schneider).

Br. 6; D. V to VII, 5 to 8; A. 6 to 8; P. 14 to 16; V. I, 2; C. 24. Body distinctly more slender than in *A. cataphractus;* its greatest breadth, over base of pectorals, about 6½ to 8 times, and greatest height, at the third pair of dorsal plates, about 7½ to 9 in total length, hence but little depressed. Vent nearer base of ventrals than in *A. cataphractus;* about 2 pairs of plates from vent to ventrals (no plates medially between them), and 9 pairs from vent to anal fin. Distance from tip of snout to vent about 4 in total length. Body anteriorly nearly oval, angular; abdominal region relatively shorter and tail, relatively longer than in *A. cataphractus.* Body octagonal; tail hexagonal, depressed, its ventral keel quite prominent. Ridges on plates of body and their backwardly directed spines more prominent than in *A. cataphractus.* Keels of the superior and inferior lateral series especially sharp on tail; 5 or 6 pairs of plates from head to first dorsal, and 10 to 13 pairs between ventrals and anal; from anterior end of first dorsal to point of union of the dorsal pairs behind second dorsal about 22 pairs, thence to base of caudal 14 to 17 median plates. Head about as broad as deep, the breadth about 1½ in its length; head about 5⅓ or somewhat more in total length, much narrowed anteriorly. Snout projecting beyond premaxillaries, lower jaw included; a pair of short upwardly and backwardly directed spines near tip of snout; a pair of strong supraocular and 1 of occipital spines; interorbital space considerably less than longitudinal diameter of orbit; preorbital not covering upper jaw; suborbital without prominent spine; no barbels under tip of snout; mouth somewhat larger than in *A. cataphractus,* maxillary nearly reaching anterior edge of orbit; 5 pairs of barbels, 1 near and 2 at tip of maxillary, 1 near angle of mouth, and 1 (bifurcate) out on side on lower jaw; none on branchiostegal membrane. Orbits quite large, their longitudinal diameter about 4 in head. Preopercle with 2 quite small spines, 1 at its posterior angle, the other below this, and 1 or 2 smaller ones below these; opercle unarmed. Branchiostegal rays 6. Teeth fewer than in

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*Diagnosis: Body tapering, octagonal anteriorly, hexagonal posteriorly, a little depressed, its height 7½ to 9, and its breadth 6½ to 8 in total length. Head 5⅓; pectorals equal to head. Plates in dorsal series 44, sometimes 41–43; from occiput to first dorsal 5–6; between ventrals and anal 10–13; between dorsals 6 or 7; 5 pairs of barbels, 3 on maxillary, 1 near angle of mouth, and 1 (bifurcate) on lower jaw; 1 pair recurved spines near tip of snout; 1 pair supraocular and 1 of occipital spines. Teeth on jaws. Gill membranes joined to isthmus. Yellowish gray, with 2 or 3 cross bands, pale below. B. 6; 1 D. 5–7; 2 D. 5 to 8; A. 6 to 8; P. 14 to 16; V. 3 (I–2); C. 2–9–11 + 2.

A. cataphractus, present on jaws. First dorsal, with 6 or 7 plates between it and occiput, with 5 to 7, usually 5 or 6, spines, its length considerably more than its height; third and fourth rays longest; second dorsal distant from first about ½ the length of either fin, with 5 to 8, usually 6 or 7, rays, a little shorter but somewhat higher than first dorsal; anal fin with nearly ½ its length in front of first ray of second dorsal and ending a little behind the middle of the latter is somewhat higher than this and with 6 to 8, usually 7, rays; pectoral fin, about as long as head, with 14 to 16, usually 14 or 15, simple rays; ventral fin short, a little more than ¼ of pectoral, rays 3 (I, 2), the 2 soft rays of about equal length; caudal narrow and long, about 8 in total length, with 9 long rays, and on each side 2 or 3 short ones. Lateral line, pores 23 to 25 (Collett), 30 (Kroÿer). Color yellowish gray, with 2 or 3 large grayish brown patches forming indefinite cross bands, first above base of pectorals, second under posterior part of first dorsal, and third under middle of second dorsal; between these smaller indefinite patches and cloudings; fins, especially pectorals and caudal, brownish black toward their tips; ventral surface grayish yellow; on each side of head a quite broad black band from tip of snout across orbit and preopercle. Males rarer than females (Collett), distinguished by having outer soft ray of ventral fin about twice as long as inner, more than ½ of pectorals. Young (according to Steenstrup and Lütken) with a shorter and thicker body, its breadth about 7 in total length, tail compressed. Head broader and anteriorly blunter, with somewhat oblique mouth and lower jaw projecting beyond upper. Keels of plates strongly developed, with sharp backwardly directed spines; longitudinal keels on upper and under side of tail distinctly double. Pectoral and ventral fins proportionately longer. Vent lies farther back, between fifth or even eighth pair of ventral plates. Arctic Ocean, south to Newfoundland and Norway; recorded from northern coast of Norway, east and west of North Cape, but not south of 70° N. lat., Spitzbergen and west of these islands, between them and Beeren Island, and between this and Norway (Collett); Faröe Islands and Iceland (Lütken); Greenland, spreading as far south as Newfoundland with the cold ocean currents. Dr. Reinhardt has shown that the fish described as *Cottus cataphractus* from Greenland by Fabricius belongs to this species, and that Bloch's statement that the type of the species came from the East Indies is erroneous. It is a deep-water species, found in 123 to 260 fathoms, at a temperature of +1.6° C. to −1.1° C. (Nordhavs expedition); 50 to 120 fathoms, in the Varangerfiord. Here described from papers of Collett and Lütken, and from small specimens from Upernavik. (Eu.) (*δέκα*, ten; *γωνία*, angle.)

Cottus cataphractus, FABRICIUS, Fauna Grœnl., 155, 1780, Greenland; not of LINNÆUS.

Agonus decagonus, BLOCH & SCHNEIDER, Syst. Ichth., I, 105, pl. 27, 1801, erroneously recorded from the East Indies, the type came from Greenland; GÜNTHER, Cat., II, 215, 1860; COLLETT, Norges Fiske, 40, 1875; LÜTKEN, Forelöb. Meddel. Nord. Ulkefiske; Vidensk. Meddel. fra den Naturhist. Foren. Kjöb., 381, 1876; COLLETT, Fiske fra Nordhavs Expeditionens, Sommeren 1878, Christ. Vidensk. Selsk. s. Forh., No. 14, p. 28, 1878; COLLETT, Norske Nordhavs Expedition, 1876–1878, Zool. Fiske, 44, pl. 2, figs. 11–12, 1880; JORDAN, Proc. Ac. Nat. Sci. Phila. 1883, 293; LILLJEBORG, Sveriges och Norges Fiskar, Första Häftet, 193, 1883–84.

Aspidophorus spinosissimus, KRÖYER, Ichth. Bidrag. Naturhist. Tidskr., I, 250, 1844–45, Greenland; KRÖYER, Gaimard, Voyages en Scand., etc., Zool. Atlas, Poiss., pl. 5, figs. 2a–2d, 1845.

Aspidophorus malarmoides, DES LONGCHAMPS, Mém. Soc. Linn. de Normandie, tome IX, 167, 1853.

Aspidophorus decagonus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 223, 1829; J. REINHARDT, Sr., Overs. over det. Konigl. Danske Vid. Selsk. s. Forh., 53, 1830–1832; KRÖYER, Ichth. Bidrag. Naturhist. Tiddskr., I. 243, 1841–45. KRÖYER, Gaimard, Voyages en Scand., Lapnonie, etc., Zool. Atlas, Poiss., pl. 5, figs. 1a–1d, 1845.

Agonus spinosissimus, GÜNTHER, Cat., II, 214, 1860.

Leptagonus spinosissimus, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167.

Brachyopsis decagonus, JORDAN & GILBERT, Synopsis, Fishes N. A., 727, 1883.

767. PODOTHECUS, Gill.

Podothecus, GILL, Proc. Ac. Nat. Sci. Phila. XIII, 1861, 77, 259 (*peristethus* = *acipenserinus*).

Paragonus, GILL, Proc. Ac. Nat. Sci. Phila. XIII, 1861, 167, 259 (*acipenserinus*).

Body tapering nearly uniformly from head to caudal, about as high as or higher than wide anteriorly; depth about 6 to 8 inches in length; head about 4, compressed; plates in dorsal series about 35 to 40, 4 or 5 pairs between occiput and first dorsal fin; gill membranes joined to isthmus, without free fold; no scattered barbels under lower jaw or on branchiostegal membranes; 2 complex groups of barbels on under side of tip of snout, another group at each angle of mouth; usually a few barbels at sides of pores under lower jaw; tip of snout with usually 2 pairs of sharp slender spines, the anterior directed forward, the posterior outward and backward. Mouth small, inferior, snout projecting far beyond it. Teeth on both jaws few and weak, sometimes wanting on 1 or both jaws; none on vomer and palatines; plates of body spinous; 1 pair of supraocular and 1 pair occipital spines; both dorsals present. This genus is very close to *Agonus*, differing mainly in the spinous plates of the body. The numerous species differ much among themselves. (*πούς*, foot; *θήκη*, box; from the groove for the receptacle of the ventrals which appears through the shrinking of the naked skin in preserved specimens.)

- *a*. Plates on caudal peduncle all or nearly all armed each with a spine.
  - *b*. Barbels below snout very numerous and large; angle of mouth with many barbels. ACCIPITER, 2409.
    - *c*. Dorsal rays VIII–9; teeth well developed; fins all very high, the pectoral emarginate in the adult, its longest rays 1⅐ in head; ventral long; anal rays 10.
    - *cc*. Dorsal rays XI–8; teeth present; fins moderate; pectoral not emarginate; ventral short; anal rays 9. HAMLINI, 2410.
  - *bb*. Barbels comparatively few and slender.
    - *d*. Dorsal rays VIII–8; teeth in upper jaw almost obsolete; fins moderate; pectoral not emarginate, 1½ in head; ventral very short; anal rays 9. GILBERTI. 2411.
    - *dd*. Dorsal rays IX–6; fins small; ventrals long; sides and top of head with very large crests; anal rays 6. THOMPSONI, 2412.
- *aa*. Plates on caudal peduncle mostly not ending in spines; fins rather low, the anal rays 7 or 8.
  - *e*. Teeth well developed; barbels below snout and at angle of mouth long and numerous. ACIPENSERINUS, 2413.
  - *ee*. Teeth wanting in the adult; barbels rather small and sparse; body not everywhere deeper than wide; the caudal peduncle very long, slender, and depressed. VETERNUS, 2414.

2409. PODOTHECUS ACCIPITER, Jordan & Starks.

Head $3\frac{3}{5}$ in length; depth $6\frac{1}{2}$. D. VIII, 9; A. 10; pectoral 15; lateral plates 36; eye $4\frac{1}{2}$ in head; snout $2\frac{1}{8}$; second dorsal spine $1\frac{5}{6}$; second dorsal ray $1\frac{1}{2}$; third anal ray $1\frac{3}{5}$; caudal $1\frac{4}{5}$; upper ray of pectoral $1\frac{1}{7}$; ventrals $2\frac{1}{3}$. Body elongate, not compressed; head triangular as viewed from above; the mouth wide, entirely inferior, ⌒ -shaped, the lower jaw shutting behind the upper by a distance equal to $\frac{1}{2}$ eye; maxillary not reaching quite to anterior orbital rim; distance of anterior edge of upper lip from tip of rostral spines a little more than $\frac{1}{2}$ eye; teeth in upper jaw almost obsolete, villiform bands of teeth in lower jaw, wide in front, becoming narrow at sides; vomer and palatines toothless; a patch of thick barbels below snout in front of mouth, the longest equal to vertical diameter of eye, a similar patch at end of maxillary, about equal in length to the shortest on snout; 2 short barbels on each side of lower lip between symphysis and angle of mouth. A pair of short, sharp, rostral spines, pointing directly forward; at their base and much wider apart is a pair of spines which point upward, backward, and slightly outward; running backward from these are the ridges that bound the wide groove in which the maxillary process fits; these approach each other behind and end in sharp spines which point backward and upward, these spines midway between middle of eye and the spines behind rostral spines; a pair of large spines above posterior third of eye, and a pair of large ones at occiput, these continuous with the upper ridges; a curved bridge running from superior orbital rim and ending in a small spine just above opercle; a small ridge on opercle; preopercle with a large spine; a couple of spines below eye at lower edge of suborbitals; running from them to tip of snout a ridge along lower edge of preorbitals, somewhat irregular but without spines; interorbital space wide and deeply concave, a pair of ridges on each side, converging forward; supraorbital rim prominent; anterior nostril ending in a short, wide, conical papilla, with a small opening at the apex; no noticeable depression at occiput. Dorsal ridges converging from the occiput to behind the soft dorsal, uniting on the second plate behind the base of last dorsal ray, continued as a single ridge on about 8 plates where it becomes obsolete; the upper lateral ridge follows the course of the lateral line to about the middle of spinous dorsal, where it slants sharply upward and is continued to tail above lateral line; lateral line midway between upper and lower lateral ridges posteriorly; a single spine above base of pectoral indicating an obsolete ridge between the lateral ridges, lower lateral ridge becoming obsolete under pectoral on 2 or 3 plates behind its base; abdominal ridges widest apart behind base of ventrals, uniting directly behind anal base and running simply backward, becoming obsolete on caudal peduncle; all the ridges with sharp, recurved spines, with the exception of abdominal ridges behind part of anal; where the dorsal and anal ridges disappear the caudal peduncle assumes a quadrangular shape, the corners being framed by the spines of the lateral ridges; no row of spines around base of caudal or pectoral. Fins all high, origin of dorsal between the fourth and fifth dorsal plates, the fin to base of last spine covering 6 plates, the membrane covering 2½ more; the second and third spines the longest, a membrane connecting the last spine to the body for its whole length, when fin is depressed the ends of the last spines reach to the front of second dorsal; the second dorsal to the end of last ray covers 8 plates, the membrane covers 1 more; the second and third rays are the longest, the last ray is connected to the body for about ⅓ of its length; base of anal covering 8½ plates, the rays very long and not differing much in length, the last ray not connected to body by a membrane; the fin begins in front of soft dorsal but is about coterminous with it, its rays when depressed reaching past ends of soft dorsal, reaching 6 plates past base of its last ray; pectorals barely reaching to tip of last dorsal spine, the fin pointed above, first and second rays the longest, the lower rays produced beyond the membrane, making a notch in posterior outline of fin; origin of ventrals directly below base of pectoral, their tips reaching 6 plates beyond their base; caudal long and truncated; vent directly behind base of ventrals. Color light brown above, white below; back with many narrow brown bars placed at irregular distances apart; head with many blended brown spots, 1 under eye, 1 on front margin of eye, 1 or 2 on top of head, 1 behind eye, 1 on preorbital, a similar spot on base of pectoral rays; pectoral dusky; first dorsal with 3 rows of spots across the rays, a very narrow brown border to fin, second dorsal with similar spots, not arranged in rows; anal light above, uniform brown below; ventrals white; caudal fin dark at base and 3 or 4 dark spots toward middle of fin. Ochotsk Sea; one specimen collected at Robben Island by Captain Blair. It is 8 inches in length. (*accipiter*, a hawk; in allusion to the large fins.)

Podothecus accipiter, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 816, pl. 88, Robben Island. (Coll. Capt. J. G. Blair. Type in L. S Jr. Univ. Mus.)

2410. PODOTHECUS HAMLINI, Jordan & Gilbert, new species.

D. IX to XI–8; A. 9 or 10; P. 15. Head 3¾ in length; depth, not including spines of dorsal plates, 8⅖; width at base of pectorals 7⅙; length of caudal peduncle, from base of last anal ray, 2$\frac{6}{7}$; snout long and slender, depressed, produced beyond the mouth for a distance equaling a little less than ½ its length, the tip formed of 2 spines, the space between which is covered with membrane; a pair of strong, nearly erect spines at their base, between which are 2 or 3 very small spines on the median line; a second pair of strong spines at posterior end of premaxillary fossa, the ridges bounding which may bear 1 or more pairs of small prickles; preopercle with a wide wing-like crest terminating in a bluntish spine; snout long and slender, its lateral profile concave as seen from above or below; suborbital crest with 3 very strong, backwardly hooked spines; interorbital space very narrow, deeply concave; fins all low; supraocular ridge strong and much elevated, the interorbital space deeper and narrower than in any other species of this group, its least width 1⅐ in orbit; postorbital spine small; ridges on sides of snout minutely serrate; an irregular group of small spines above and behind anterior nostril; lateral ridges of head with 3 pairs of very strong backwardly directed spines in line with the greatly expanded preopercular ridge; the posterior portion of this ridge produced into a compressed, bluntish process which overlaps the subopercle and reaches margin of gill opening; opercular and temporal ridges low and sharp. Teeth present on jaws in the young, becoming nearly or quite obsolete in adults; in the type, 17 cm. long, a few weak teeth on one side of upper jaw, but none elsewhere; vomer and palatines toothless. A cluster of 14 barbels on each side of lower surface of snout in front of mouth, and a cluster of 14 occupying end of maxillary and angle of mouth; each side of lower lip with 2 barbels; gill membranes widely joined to the isthmus, without distinct free fold posteriorly. Plates on body with very strong spines, those of the dorsal series the largest, but decreasing rapidly backward, becoming much smaller than the lateral series under the second dorsal fin; a median series of short sharp spines still persists along entire back of tail after the confluence of the dorsal series; the lateral series lower anteriorly, the upper row persisting to gill opening, the lower row now becoming obsolete about 4 plates behind axil; the abdominal series bear short sharp spines (longer in the young), becoming obsolete along anterior portion of anal fin; of the dorsal series, 4 are in front of the first dorsal, 10 (or 9½) along base of first dorsal, 1 (or 1½) between dorsals, 9 along base of second dorsal, 15 along back of tail, the first of the latter being the plate in which the dorsal series first becomes confluent; anterior portion of lateral line running along upper lateral series, gradually descending to middle of sides where it runs on a special row of plates which bear no spines; where the lateral line begins to ascend, 3 of these become confluent with corresponding plates of the upper lateral series; in advance of these, 5 members of the series again appear distinct, considerably enlarged and bearing spines; 40 pores in the lateral line; fins all comparatively short and low; pectorals reaching twelfth plate of upper lateral series, the longest ray equaling length of snout and ½ eye; rays becoming rapidly shortened below, the lower 5 or 6 slightly thickened with exserted tips; ventrals very short, not exceeding length of snout before mouth, not received into longitudinal groove. We consider it very doubtful whether such a groove exists in any of the other species of this group. It has been described as existing in the types of *P. gilberti* (Collett) and *P. peristethus*, Gill. In both cases the type specimens were in a poor state of preservation, and the groove was probably due to a softening of that longitudinal strip of the abdominal wall, which includes the anal opening, and extends backward from the base of the ventral fins and is interposed between the firm outer series of ventral plates. That such a softening had occurred in the type of *Podothecus peristethus* is evident from Gill's statement that the ventrals had dropped out. This view is rendered more probable from the fact that *P. peristethus* is apparently identical with the common *P. acipenserinus* which contains no such groove. We have also examined 2 of the type of *P. gilberti* without being able to satisfy ourselves of the existence of any special groove. The dorsal fins are closely juxtaposed, the interspace including 1 or 1½ pairs of plates. The base of the last ray of second dorsal is midway between base of caudal and origin of spinous dorsal. Color dark or brownish above, with irregular spots or dashes of darker, which do not form definite cross bars; a black streak from eye to tip of snout passing onto lower side of rostral spines; a dark blotch on expanded limb preopercle; a black spot on base of middle pectoral rays, the fin very obscurely marked with dusky; dorsal spines and rays with linear dark markings, 1 or 2 black spots near tip of spinous dorsal anteriorly; under parts including fins, unmarked. Two specimens from *Albatross* Station 3653, off Shana Village, Iturup Island, in 18 fathoms. A young individual from *Albatross* Station 3646, off Robben Island, 18 fathoms, seems to belong to the same species, but has the snout less produced and the dorsal VIII, 6; anal 8. (We take great pleasure in naming this species in honor of Hon. Charles Sumner Hamlin, late Assistant Secretary of the Treasury, under whose auspices the fur seal investigations of 1896 and 1897 were carried on by the United States Fur Seal Commission.

Podothecus hamlini, JORDAN & GILBERT, Rept. Fur Seal Invest. 1896, 1897 MS., off Shana Bay, Iturup Island, Kuril Group. (Type, 5662, L. S. Jr. Univ. Mus. Coll. *Albatross*.)

2411. PODOTHECUS GILBERTI (Collett).

Head about 4; depth 7½ or 8. D. VIII, 8; A. 9; P. 17; V. I, 2. Body deeper than wide; octagonal to end of dorsal and anal fins, hexagonal on tail. The curved spines of the dorsolateral, superior and inferior lateral ridges strong and sharp as far as base of caudal. Ventral series of plates spinous to origin of anal, uniting behind it to form a single series; dorsal series uniting into 1 behind second dorsal; about 12 to 15 well developed, radially striated plates without tubercles or spines on breast; a few median plates between ventrolateral series behind vent. Head 4-hedral, tapering, cheeks vertical, orbit large, high up, about equal to the concave interorbital space. Supraocular and occipital ridges high, with crenulate edges, the former ending in a sharp, the latter in a blunt, spine; suborbital and opercular bones radially striated; suborbital ridge low down on cheek, thin, with crenulate edge and a small sharp spine at its posterior end; preopercle with a high thin keel with serrated edge, ending in a strong blunt spine; rostrum projecting far beyond premaxillaries, with a pair of spines at tip directed forward, another pair, farther apart, curved backward and outward. Maxillary reaching about to front of orbit; lower jaw very short, broad, falling far short of upper. Teeth on lower jaw weak, few and excessively weak on upper jaw, none on vomer or palatines. A group of barbels under tip of snout, another at angle of mouth (specimen with mouth in bad state). Dorsals separated by about 3 pairs of plates; anal begins a little in front of origin of second dorsal; pectorals about 6 in body, their base nearly 3 in their length; ventrals (male?) about ⅔ as long as pectorals. Lateral line about 35. Color apparently brownish or yellowish, with well-defined dark-brown spots on sides of head, back, and sides; the spots largest along sides, some of them as large as the osseous plates, smaller on back; apparently a dark band from front of orbits to tip of snout; dorsals with dark patches; a dark spot on base of pectoral. Kamchatka. This account taken from 1 of the type specimens presented* to the Leland Stanford Junior University Museum by Dr. Collett. (Named for Charles Henry Gilbert.)

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* The following is Dr. Collett's description: First dorsal 8; second dorsal 8 or 9; anal 10 or 11; pectoral 15 to 17; lateral line 38. The body is very elongated and compressed, rather high in front, and tapering to the tail. Its height (from ventrals to first dorsal scale) equals the length of the snout, and is contained in the total length about 8 times. The tail is compressed, long and slender; its height everywhere greater than its breadth. The head: Its length is contained in full-grown specimens 4 times, in younger ones about $3\frac{3}{4}$ times in the total length (caudal included). Thus in 4 specimens of different sizes the proportions are the following: Total length 183 mm., head length 3-66 times; total length 254 mm., head length 3-73 times; total length 277 mm., head length 4-01 times; total length 290 mm., head length 4-02 times. Snout very long, 3 times longer (or more) than the interorbital space (between the bases of the supraocular spines). Posterior part of the head comparatively smooth, the interorbital space rather concave; no quadrangular pit on the occiput in front of the dorsal scales. Eye comparatively large; the horizontal diameter a little larger than the vertical. It is contained a little more than 2 times in the length of the snout, and rather more than 4 times in the length of the head. Cirri on lower side of snout (in front of the premaxillary) and at the angle of the jaws.[1] Their length equals that of the eye. Mouth entirely inferior; distance from premaxillaries to tip of rostril spines about equal to the length of the eye. Teeth in the jaws, vomerine or palatine teeth none. Armature of the head much like that of *A. acipenserinus*. The rostral spines 4, 2 projecting horizontally forward, 2 (behind the first) curved backward. A third pair on the snout (much nearer the eye than the rostral spines). Orbital ridge with a single spine (supraocular, no preocular); the lower ridge finely serrated. Occipital ridges, operculum, and preoperculum as in *A. acipenserinus*, but the spines more pointed and longer. Suborbital with a double ridge at its lower margin, the upper ridge with 2 distinct spines behind, and a third (sometimes indistinct) at equal distance from the eye and the tip of the snout. Head with about 18 distinct spines altogether. Armature of body: Plates on the back and sides of the same number as in *A. acipenserinus*, but the spines are longer and curved more backward, and strong everywhere from head to caudal. Between the 2 dorsal keels and between the 2 lateral keels there are no traces of another keel (as in *A. vulsus*). Breast with about 10 polygonal plates, 4 of which form a series on each side and 2 a median series; bases of pectorals and ventrals also surrounded with plates. All the plates have a short spine in their center. Dorsal plates numbering—

		Plates.
From occiput to first dorsal	(pair)	4
First dorsal extending over	do	8
Between the dorsals	do	3
Second dorsal extending over	do	9+1
From second dorsal to caudal	(single)	15

The dorsal keel (coalescing with the keel on the other side at the fifteenth plate in front of the caudal fin) is consequently composed of 38 or 39 plates; the lower lateral keel extending from lower base of the caudal to base of the tenth pectoral ray, contains 35 plates. Abdominal plates numbering—

		Plates.
From ventrals to anal	(pair)	11
The anal extending over	do	10
From anal to caudal	(single)	17

The abdominal keel (coalescing at the seventeenth plate in front of the caudal) is formed by a series of 38 plates. Lateral line distinct; 38 pores. Fins: In the 10 specimens at present preserved in the museum at Christiania, the fin rays are the following:

1 D. 8	2 D. 8	A. 10	P. 17-17
8	9	10	?-16
8	9	10	16-16
8	8	10	15-16
8	8	10	17-17
8	8	10	17-17
8	8	10	16-17
8 (+1)	8	11	16-17
8	8	10	15-16
8	9	10	17-17

First dorsal begins behind the fourth dorsal plate and has 8 rays (1 specimen has an additional slender ray in the space between the 2 dorsals). Its height equals its distance from the head. It extends over 8 scales; the first 2 rays in the space between the fourth and fifth plate. The dorsal fins are separated by 3, sometimes by 4 plates. Second dorsal has 8, sometimes 9, rays, and extends over 8 plates; behind the last rays is 1 pair of plates

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[1] All the specimens are in a bad state of preservation and most of the barbels are lost.

Agonus gilberti, COLLETT, Proc. Zool. Soc. London 1894, 670, pl. 45, Kamchatka. (Coll. Henry Lund. Types, Mus. Christiania; cotype, 2783, L. S. Jr. Univ. Mus.)

2412. PODOTHECUS THOMPSONI, Jordan & Gilbert. new species.

D. VIII or IX–6; A. 6; P. 16. Head rather broadly triangular, its greatest width across preopercular ridges greater than distance from anterior end of preopercular ridge to tip of snout. Lateral ridge on head continuous from tip of snout along suborbital bones to base of preopercular crest, the lateral spines usual in this genus, being represented by triangular processes borne on the ridge; preopercular ridge produced posteriorly beyond gill opening, but not spine like; snout terminating anteriorly in 2 rounded processes, each bearing on its upper surface a vertical crest, and finely serrate along its margins; no terminal pair of strong spines as in other species; under side of snout with an acute median spine directed downward and backward; a pair of strong spines on upper side of snout behind terminal nostral ridge; a pair of coalesced spines behind the nostral groove; a semicircular series of spinelets below the eye; two small tufts of filaments on under side of snout, one on middle of maxillary, and one at its tip. A narrow band of sharp teeth in each jaw; vomer and palatines toothless. Gill membranes united to isthmus without evident free fold. Orbital rim much elevated; interorbital space narrow, deeply concave, its width $\frac{9}{10}$ diameter of orbit; occipital ridges strong, elevated posteriorly, ending in a backwardly directed spine which is much larger than those of the body plates; occipital area narrow, deeply concave, its central portion sunk somewhat below level of interorbital space, from which it is separated by a shallow transverse groove; a similar groove behind occipital spines; area between occipital and temporal ridges also deeply concave; a strong opercular ridge. All the plates with strong spines, including those of the ventral series; the weakest spines are on the anterior plates of the lateral series; plates on breast with central spine and radiating ridges; dorsal series with fewer plates than in other

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before the unpaired series begins. Anal has commonly 10 rays (in 1 specimen 11); its height equals that of the second dorsal, and is rather less than that of the first dorsal. It commences between the eleventh and twelfth pairs of scales in the abdominal series. Ventrals short in the females, shorter than the vertical diameter of the eye; longer in the male, equalling the length of the snout. Each has 1 short spine and 3 articulated rays, 2 of which are divided at their base. They are received in a longitudinal common groove ("*Podothecus*"). Pectoral has 16 or 17, rarely 15 rays, some of which are sometimes branched in their upper half, but not always. The first ray is short, about equal to $\frac{1}{2}$ the second ray; the lowermost rays a little thicker than the rest. Its form is a little emarginate, the fifth lower ray being a trifle longer than the sixth and seventh. The tip extends to a distance from the anal of 2 or 3 plates. Color: grayish brown, with dark spots and shortish bands; belly whitish. On the upper part of the head the spots form longitudinal bands, 1 of these (single) running down in the median line of front, between the eyes. A second (and more distinct) band extends on each side of the snout from the tip to the anterior margin of the eye, hence running under the orbital rim; in some specimens it is continued as a narrow ring round the eye, but commonly this is broken and indistinct. On the opercles and the sides of the snout the spots are roundish and well marked. On the body also the spots are roundish, barely oblong, their size equalling that of the pupil. They are darkest and most distinct on the back, being sometimes almost obliterated on the sides. The color of the fins is rather indistinct in the badly preserved specimens before me. The pectorals have a dark oblong spot at their bases (from about sixth to eleventh ray); the dorsals have 2 dark bars separated by whitish, and with the tip in first dorsal also blackish (in second whitish). The caudal has a dark cross bar a little behind the base, and a dark margin. The anal is apparently whitish to the margin in the female; in the single male specimen at least the outer half is blackish. Kamchatka (type specimens in the Christiania Museum). (Collett.)

species; 3 in front of spinous dorsal, 11 (or 12) along base of spinous dorsal, 2 (or 1) between dorsals, 6 at base of soft dorsal, 14 (or 13) unpaired plates on back of caudal peduncle. The unpaired plates with the spine notched at tip; all the plates marked with strong radiating ridges and the surface of the spines minutely roughened. Color, light gray above, white below; top and sides of head with black dots and dashes; back crossed by six narrow black bars. Distinguished from all other species of the genus by the great development of the lateral ridge and spines on head. This gives the head and especially the snout a much broader outline, approaching in this respect *Agonus cataphractus*. The species is represented by several young specimens in rather poor condition, the type being 53 mm. long. The outline and armature of the head are not, however, essentially different in young and adults of such species as are known to us from specimens of different sizes. Off Shana Bay, Iturup Island, Kuril Group. (This species is named in honor of Prof. D'Arcy Wentworth Thompson, of the University at Dundee, the commissioner of Great Britain in the fur seal investigations in Bering Sea in 1896 and 1897.)

Podothecus thompsoni, Jordan & Gilbert, Rept. Fur Seal Invest. 1896, 1897 MS., off Shana Bay, Iturup Island, at Albatross Station 3653, in 18 fathoms. (Type, No. 5667, L. S. Jr. Univ. Mus. Coll. *Albatross*.)

2413. PODOTHECUS ACIPENSERINUS [*] (Tilesius).

(Common Alligator Fish.)

B. 6; 1 D. 8 to 10; 2 D. 7 or 8; A. 7 or 8; P. 17 or 18; V. 3 (I, 2); C. 1–12–1; vertebræ $12 + 29 = 41$. Pyloric cæca 7 (2 individuals). Total length reaches 10 inches. Body as deep as wide, ridges of dorso- and ventrolateral series strong, while those of the rest are but little developed, thus giving body a sharply quadrangular form in front; dorsal and ventral faces flat between ridges, the lateral convex. Behind middle of first dorsal the lateral ridges become more prominent and body more regularly 8-hedral; tail 6-hedral, strongly depressed. The strong, curved, minutely serrated spines of the dorsolateral series grow smaller from occiput backward and disappear at beginning of second dorsal; superior lateral series spinous from middle of first dorsal to middle of peduncle; inferior lateral series spinous for a short distance from a little in front of to a little behind anal; ventrolateral series keeled, not spinous. Two pairs of plates between last ray of second dorsal and first median plate, and 2 to 4 pairs between last anal ray and first median plate. About 20 well-developed plates on breast. Branchiostegal membranes and lower side of mandible everywhere naked; two or 3 moderate plates in front of pectoral fin; membrane between ventrolaterals, behind vent, with numerous imperfectly developed plates; none between ventrals and vent. Head 4-hedral, tapering to a long snout, its width 6¾ in length of body, nearly vertical; orbits high up, about 4⅓ in head. Supraocular ridges high, with a very strong spine; occipital ridges long, rising gradually and ending in a single strong spine; temporal ridges moderate, ending in a small, suprascapular spine; suborbital, preopercle, and opercle radially striated; suborbital ridge low down on cheek, shelf-like in front on preorbital, with 2 small spines, a minute one on preorbital and a strong one on preopercle. Opercle with a slight ridge, minute spine or none; interorbital space concave, about 3½ in head, flat between the supraorbital ridges, covered with skin and with 2 minute ridges extending upward longitudinally from near the mesethmoidal spines; rostrum projecting far beyond premaxillaries, with a pair of spines directed horizontally forward, behind these another pair, farther apart, curved backward and outward. Snout from premaxillaries to tip of spine equal to orbit; maxillary reaching front of orbit; lower jaw very short, broad, falling far short of upper. Teeth weak, few, excessively few and weak on upper jaw, none on vomer and palatines. A pair of complex groups of barbels on under side of tip of snout; another group at angle of mouth, apparently made up of 4 subordinate groups—1 near tip and 2 at tip of maxillary, and 1 at angle of mouth; a pair of double barbels at sides of lower jaw. Dorsal fins close together; anal beginning a little in front of second dorsal: pectorals about 6 in body. their base 2½ in their length, nearly truncate. Ventrals of female equal orbit, in male twice as long; width of caudal at base 3 in the length. Lateral line 37 to 39. Color grayish brown above, yellowish below, sides with narrow undulating brownish black vertical streaks in intervals between plates; first dorsal with a broad band of darker along middle, black edged; pectorals with a dark bar near base; several more or less distinct cross bars of darker, formed by long dark streaks on rays; inferior third of fin nearly uniformly dark; ventrals light in female, dark in male; anal edged with black posteriorly; caudal olivaceous, tipped with darker. Length 10 to 12 inches. Kamchatka to Puget Sound, in moderate depths, everywhere the most abundant of the family. Very common in Puget Sound. The specimens here described from the Aleutian Islands. According to Dr. Gilbert, this is one of the most abundant species in Alaska, occurring everywhere in shallow water around the Aleutian Islands and in Bristol Bay. (*acipenserinus,* sturgeon-like; *Acipenser,* sturgeon.)

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[*] Diagnosis: Body tapering uniformly from head to caudal, as high as wide anteriorly, width at base of pectorals 7 in length; tail from front of second dorsal to caudal much depressed; head 4; plates in dorsal series 37 to 38; between occiput and first dorsal 4 pairs; between dorsals 2 or 3; from ventrals to anal 10 to 11 pairs. Gill membranes joined to isthmus without fold; no teeth on vomer or palatines. A pair of complex groups of barbels on under side of tip of snout, another group at angle of mouth, and a pair of double barbels at sides of lower jaw. Snout with 2 pairs of spines, 1 pair directed horizontally forward, the other curving backward and outward. One pair supraocular and 1 pair occipital spines. Color grayish brown, yellowish below; sides with narrow undulating vertical blackish streaks.

Agonus acipenserinus, TILESIUS, Mém. Acad. Petersb., IV, 422, pl. 11, fig. 163. 1811, Unalaska; GÜNTHER, Cat. Fishes, II, 212, 1860; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 332.

Podothecus peristethus, GILL, Proc. Ac. Nat. Sci. Phila. XIII, 1861. 77, 259, Simeahmoo, Washington Territory.

Phalangistes acipenserinus. PALLAS, Zoog. Rosso-Asiat., III, 110, pl. 1811.

Aspidophorus acipenserinus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 207, 1829.

Podothecus acipenserinus, JORDAN & GILBERT, Synopsis, 730, 1883.

Paragonus acipenserinus, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167.

2414. PODOTHECUS VETERNUS,* Jordan & Starks.

Head $3\frac{2}{3}$ in length; depth $7\frac{1}{3}$. D. IX, 8; A. 8; scales in lateral line 38 or 39; pectoral 15; orbit $4\frac{1}{5}$ in head; snout $2\frac{1}{5}$; upper rays of pectoral $1\frac{1}{2}$; highest dorsal spine $2\frac{1}{3}$; highest dorsal ray $2\frac{3}{5}$; highest anal ray $2\frac{3}{5}$; caudal $2\frac{1}{2}$. Body elongate, about as wide as deep anteriorly, much wider than deep posteriorly; mouth inferior, the lower jaw shutting far behind the upper; teeth on jaws, vomer, and palatines obsolete; a few short barbels beneath snout in front of mouth and at angle of mouth, their length about equal to pupil, lower jaw very cavernous. A pair of short, blunt, rostral spines pointing directly forward; at their base and wider apart is a pair of sharp spines curving outward, backward, and upward; at the posterior end of the rather wide rostral groove is a pair of small spines pointing upward and backward; from their base a pair of diverging ridges run through the interorbital to above posterior margin of orbit; a strong spine over eye, and a longer one at occiput; a low, sharp ridge on side of head, running from ocular spine and ending in a low spine at upper end of gill opening; a very low ridge on opercle not ending in a spine; preopercle with a strong spine with a wide keel-like base; a hooked spine below eye on suborbital, from which a ridge runs along lower edge of preorbital to end of snout, below posterior end of rostral groove; on this ridge is a triangular spine pointing backward; between this and the suborbital spine is an acute outward-pointing spine not much widened at its base; interorbital concave, its width equal to the length of the eye, 2 in snout; supraorbital rim prominent. Dorsal ridge of body continuous with occipital and supraorbital spines, joining its fellow of the opposite side posteriorly directly behind the second dorsal, and continued simply on caudal peduncle; the spines large and strongly hooked back anteriorly, becoming nearly obsolete posteriorly, only traceable on caudal peduncle by the center of each plate on the median line being slightly produced; spines on lateral ridges with stronger spines near middle of body than anteriorly or posteriorly; 2 or 3 blunt spines above base of pectoral, indicating an obsolete ridge between lateral ridges; lateral line at end of pectoral fin running along the upper lateral ridge a short distance, and becoming obsolete anteriorly; spines of abdominal ridge low and blunt, nearly obsolete posteriorly, the ridge joining its fellow of the opposite side directly behind base of anal fin and continuing as a single low ridge on caudal peduncle; a small plate before base of each ventral, a median row of 3 running forward to gill membrane, 3 on each side of these, a row around base of pectorals. Origin of dorsal behind the fourth dorsal plate, including the membrane behind, it covers 9 plates; 1 plate between dorsals, the second dorsal covers 8 plates, behind which are 14 plates; the last ray of first and second dorsal and anal connected to the body by a membrane; upper ray of pectoral the longest, reaching to below the ninth or tenth spine of dorsal ridge, the lower rays slightly produced beyond the membrane. Color in spirits, reddish brown above, light below; narrow, irregular, transverse streaks across back and sides, a longitudinal dark bar along each side of base of both dorsals; a dark streak forward from eye; margin of spinous dorsal blackish, soft dorsal with a small spot behind, a dark spot on pectoral rays near their base, and some dark bars behind it across rays; anal and ventrals colorless; caudal dusky. Sea of Ochotsk. A single specimen, about 8 inches in length, collected by Captain Blair at Robben Island. This species is related to *P. acipenserinus* and *P. gilberti,* differing from the former in having fewer and shorter barbels, teeth on jaws obsolete, keel and preopercle larger, dorsal ridges without spines posteriorly, and the spines on the preorbital ridge different in shape. From the latter in having the body different in shape, not everywhere deeper than wide, but the reverse posteriorly; anal much shorter and lower, no teeth on jaws, and the spines on preorbital ridge better developed and different in shape. (Jordan & Starks.) (*veternus,* an old man, veteran, in allusion to the want of teeth.)

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* Allied to *Podothecus veternus* is a Chinese species:

PODOTHECUS STURIOIDES (Guichenot).

D. IX, 8; A. 10; P. 15; V. I, 2. Depth, at nape, 8 in total length. Body elongate, octagonal in front, much attenuated, and becoming pentagonal behind; everywhere covered with osseous radially striated, keeled plates which are higher than long; the keels with denticulate edges and terminating in backwardly directed spines, forming 8 longitudinal series, 4 on each side. Breast in front of pectorals and median line of belly armed with smaller polygonal plates with keels or tubercles, but without backwardly directed spines. Snout conical (not divided at tip), forming a strong projection in front of mouth, and somewhat resembling that of the sturgeon, armed at its tip with 2 pairs of spines, the anterior directed forward (?) and the posterior upward and backward; the bony pieces of which it is composed with their edges denticulate, as are the sharp keels of the suborbitals; a strong backwardly directed spine (closely approximated nasal spines) on middle of snout. Lateral line marked by an interrupted series of small tubulous and osseous elevations, and lies between the 2 adjacent lateral series of plates; commencing at height of shoulder it describes a slightly convex curve and bends a little to run in a straight line to base of caudal. Mouth a little protractile, with fleshy lips, and situated far behind tip of snout, cleft as far back as front of eye. Lower jaw with extremely fine, velvety teeth; none on upper jaw nor on vomer or palatines. A group of long, unequal, fleshy filaments or barbels at each angle of upper jaw and under tip of snout; under each branch of lower jaw 2 others, which are excessively small. Eyes large, oval, on line with profile; interorbital space a little concave, equal to "transverse" (vertical?) diameter of orbit. A projecting tubercle or spine on posterior upper part of orbit, and another on each side of posterior part of occiput. Dorsals separated by an interval equal to eye; the anterior longer than posterior; their form elliptical, their height nearly equal to that of body; their rays slender, flexible at tips, especially those of posterior fin. Pectorals large, nearly as long as head; upper rays a little longer than those next below, decreasing gradually to tenth, whence they increase a little and again decrease by degrees to last; 5 lower rays thickest, their tips a little exserted; rays all simple (not branched). Anal commencing under end of first dorsal, which it equals in length and height. Origin of ventrals under base of pectorals; they are small (tips broken in the single individual), apparently of 3 rays. Caudal long, its border rounded, about 8 in total length. Color yellowish brown, paler below, with a very light black punctulation and more or less regular, round brown spots on head and body; spots smaller on back than elsewhere; a spot of same form and color on base of pectorals; pectoral fins uniform yellow; dorsals with brown upon rays; a dark border on spinous (dorsal); a dark, narrow band from anterior border of eye to tip of snout. A single specimen, $10\frac{1}{2}$ inches long. China. (Guichenot.) Guichenot's figure gives 1 more ray in anterior dorsal than the description, and gives the caudal fin as strongly concave (*sturio*, sturgeon; εἶδος, likeness.)

Paragonus sturioides, GUICHENOT, Nouvelles Archiv. Museum, 202, pl. XII, fig. 3, China.

Podothecus veternus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 819, pl. 89, Robben Island. (Coll. Captain Blair. Type presented by Alaska Commercial Company to L. S. Jr. Univ. Mus., No. 4823.)

768. AGONUS, Bloch & Schneider.

Agonus, BLOCH & SCHNEIDER, Syst. Ichth., 104, 1801 (*cataphractus*).
Aspidophorus, LACÉPÈDE, Hist. Nat. Poiss., III, 221, 1802 (*cataphractus*).
Phalangistes, PALLAS, Zoog. Rosso-Asiat., III, 1811, 113 (*cataphractus*).

Closely allied to *Podothecus.* Body tapering, depressed anteriorly, its depth 6 to 6⅔, its width 4¼ to 4½ in its length. Head 3⅗ to 4, depressed, about as broad as long. Plates in dorsal series about 31 or 32; between occiput and first dorsal 4 pairs. Plates of body keeled, without spines. Mouth small, subinferior, lower jaw included; teeth on jaws, none on vomer or palatines. Gill membranes joined to isthmus, with a narrow free fold behind. Numerous scattered barbels on chin, lower jaw, and branchiostegal membrane; a single pair under tip of snout. Snout with 2 pairs of upwardly directed spines. Fins short. Northern Europe; ranging to Iceland and Greenland. (ἀ-, without; *γωνια*, joint, i. e., rigid.)

2415. AGONUS CATAPHRACTUS, Linnæus.

(SEA-POACHER; POGGE.)

Br. 6; D. V or VI, 6 to 8; A. 5 to 7; P. 15 to 17; V. 3 (I, 2); C. 2(3)–7–2(3). Pyloric cæca 5 or 6 (Day). Greatest height, over base of pectorals about 7½, and greatest depth, over preopercles, about 5 in total length; greatest height about 1½ in greatest breadth. Vent lies at about ¼ distance from base of ventrals to anal, the distance between it and tip of snout 3½ in total length. Body anteriorly depressed, appearing less so because of prominence of dorsal ridges; posteriorly much narrowed, height about equal to breadth; anteriorly, from head to about end of first dorsal, hexagonal; caudal peduncle hexagonal, with dorsal and ventral keels; middle of body octagonal. Plates of body keeled, 4 pairs between head and first dorsal; about 10 pairs from ventrals to anal; 10 median plates on peduncle; plates in dorsal series about 32. Dorsal and anal fins lie in broad, shallow grooves. Vent between plates of third pair behind ventrals. Head broad, short, its length about 4¾ in total length; anteriorly much narrowed, dorsally somewhat concave, ventrally flat. Occipital and temporal ridges each with a blunt tubercle or spine. Interorbital space concave, considerably more than longitudinal diameter of orbit. Nasal bones large, fused together, covering the mesethmoid, and armed anteriorly with 2 pairs of upwardly directed strong spines. Under these, near tip of snout, 1 pair of small barbels. Preorbital scalloped or tuberculated at its free edge, covering maxillary. Suborbital armed with a strong, pointed, outwardly and backwardly directly spine. Lower jaw included, maxillary extending much behind the short premaxillary. Mouth rather small, almost semicircular. Numerous barbels on chin, angles of mouth, and gill membranes. Eyes small, their longitudinal diameter about 5 in head, that of orbit considerably less than snout. Bones of top and sides of head striated. Preopercle with a strong backwardly and upwardly directed spine; the subtriangular opercle without spine. Branchiostegal rays 6, the membranes united and joined to isthmus, with a fold behind (?). Teeth small on jaws; none on vomer or palatines. First dorsal somewhat rounded, with 5 or 6, usually 5, spines; second dorsal with 6 to 8, usually 8, soft rays, a little higher than first; (about 3 pairs of plates between the adjacent rays of the 2 dorsals); anal begins a little behind beginning of second dorsal, and ends under the posterior end of the latter, rays 5 to 7, usually 6 or 7; pectorals large, about as long as head, broadly oval in form, with 15 to 17, usually 15, rays, of which the lower are somewhat thickened and have their tips exserted; ventrals about ½ of pectorals, rays 3 (I, 2); caudal rounded, with 7 long rays, and on each side 2 to 3 small ones. Scales with 37 to 40 pores. Color of back and sides grayish brown; sometimes with olive-brown markings and somewhat marbled with darker; ventral surface pale; 3 or 4 blackish or blackish-brown cross patches, of which 1 lies about midway on peduncle and 1 at base of caudal; ventral side of tail pale, with grayish-brown spots; dorsals, pectorals, and anal grayish, with blackish-brown patches forming indefinite bands. Males are distinguished, according to Nilsson, by a genital papilla and broader interorbital space, which equals 1½ diameter of eye. The young, about 1½ inches or more, differ in many respects from the adults. According to Steenstrup and Lütken they have a less elongate body form, its breadth about 3¾ in total length; snout less prominent; diameter of orbit about equal to snout; the 4 nasal spines smaller than in adult, but the keels on head and the post-temporal spines more prominent and sharper, as are also the keels and spines of the plates of the body, especially those on anterior part of back and on tail. Median dorsal keel of tail, which is single in the adult, is double almost to base of caudal. Barbels on under side of head rudimentary. Ventrals somewhat longer. Vent farther back, between the plates of fifth pair behind base of ventrals. Sharper contrasts between the light and dark colors. In young of about 17 mm. (about ¾ inch) Collett found head 4 in total length. Between second dorsal and caudal fins mere traces of the embryonic dorsal fin. Upper and lower jaws equal. Plates of body with very sharp and high spines; supraorbital ridge with a high; sharp spine; both the dorsal and ventral median keels of tail double. Only anterior part of lateral line apparent. In a young one of 39 mm. (about 1⅗ inches) the upper jaw projected considerably beyond the lower, and the double row of plates along dorsal face of tail was nearly fused into one (after Lütken). Total length about 8 inches, the more usual length being 6 inches. Northern Europe to western Greenland;* recorded from Baltic Sea; southern, western, and northern coasts of Norway, as far as Russian Lapland; Arctic Ocean, White Sea (Pallas); Iceland and Faröe Islands (Lütken); Great Britain; northern coast of France (Gervais and Boulart). Found in 6 to 16 fathoms (except in winter), mostly on sandy bottoms; till lately not known from American waters, it having been confounded with *Leptagonus decagonus*. (Eu.) (*cataphractus*, *κατάφρακτος*, mailed.)

Cottus cirris plurimis, ARTEDI, Ichthyologia, Part IV, 87, 1738.

Cottus cataphractus, LINNÆUS, Syst., Nat., Ed. X, 264, 1758; after ARTEDI; Syst., Nat., Ed. XII, Part I, 451, 1766; FABER, Naturgesch. der Fische Islands, 117, 1829, Jutland; Iceland.

Cottus brodamus, BONNATERRE, Encycl. Meth., 67, northern seas, after OLAFSSEN, Ist. I, 589.

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*The Museum of Stanford University has recently received 2 fine examples of this species from Davis Straits, western Greenland, through the kindness of Prof. D. W. Thompson of the University of Dundee.

Aspidophorus armatus, LACÉPÈDE, Hist. Nat. des Poiss., III, 222, 1802, Atlantic Ocean.
Cataphractus schoneveldii, FLEMING, British Animals, 216, 1828, Great Britain.
Aspidophorus europæus, CUVIER & VALENCIENNES, Hist. Nat. des. Poiss., IV, 201, 1829, sandy shores of Northern Europe; RICHARDSON, Fauna Boreali-Amer., III, 48, 1836.
Agonus cataphractus, BLOCH & SCHNEIDER, Syst. Ichth., I, 104, 1801; GÜNTHER, Cat., II, 211, 1860; GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167; LÜTKEN, Forelöb. Meddel. Nord. Ulkefiske, Vidensk. Meddel. Naturhist. Foren. Kjöb., 381 (27), 1876; COLLETT, Norges Fiske, 38, 1875; MALM, Göteborgs och Bohusläns Fauna, 406, 1877; DAY, Fishes of Great Britain, 67, pl. 28, fig. 1, 1881; LILLJEBORG, Fauna, Sveriges och Norges Fiskar, 1883-84.
Aspidophorus cataphractus, KRÖYER, Danmarks Fiske, I, 143, 1838; STEENSTRUP & LÜTKEN, Vidensk. Meddel. fra den. Naturhist. Foren. Kjöb. 1861, p. 277, 1862.

769. STELGIS, Cramer.

Stelgis, CRAMER, Proc. Cal. Ac. Sci. 1895, 821 (*vulsus*).

Body tapering, depressed throughout, its height about 8, its breadth about 7 in its length; head 4, depressed. Plates of body spinous, about 37 in dorsal series; only about 8 median plates on peduncle; 7 pairs between occiput and first dorsal. Mouth inferior, snout projecting beyond premaxillaries; teeth on jaws, none on vomer or palatines. One pair of horizontal and 1 pair of recurved spines at tip of snout. Scattered barbels or cirri on maxillary, mandible, and branchiostegal membranes; a few on under side of snout, or none. One pair preocular, 1 pair supraocular, and 2 (4) pairs occipital spines. A transverse pit at occiput. Branchiostegal membranes joined to isthmus. (*στελγίς*, or *στλεγγίς*, a scraper.)

2416. STELGIS VULSUS * (Jordan & Gilbert).

B. 6; D. IX, 7; A. 9; P. 14; V. 3 (1, 2). Body elongated, tapering rapidly backward, depressed throughout, height $\frac{6}{7}$ of breadth, the latter about 7 in length of body. All plates of body armed with spines except those in anterior and posterior parts of the ventrolateral series; spines strong and recurved. Only about 8 plates in median dorsal series of tail, but the spines of the ridge continue, double. At base of tail on each side is a spine, between the lateral ridges; vent just behind middle of length of ventrals. Lateral line about 40. Ventral surface flat throughout. Head acutely triangular (seen from above), depressed, depth about $\frac{2}{3}$ of width, the latter about $5\frac{1}{4}$ in length of body; length of head about 4; profile irregularly sigmoid, depressed at front of eyes, thence nearly straight to tip of rostral spines. Mouth V-shaped, inferior; maxillary reaching front of pupil; snout projecting anteriorly beyond premaxillaries. Teeth in bands on jaws, none evident on vomer or palatines. Maxillary, mandible, and branchiostegal region with small, scattered cirri; under side of snout with few barbels or none. Eye large, nearly as long as snout, $3\frac{2}{3}$ in head, the orbital bones forming a ridge around it; interorbital space concave, straight longitudinally, with a longitudinal groove and 2 slight ridges. Spines on head highly developed; 2 pairs rostral spines, 1 pair directed horizontally forward and the other pair behind these, recurved upward, backward, and outward; behind these a smaller pair projecting upward (mesethmoid spines); orbital ridge serrated, with a peculiar spine anteriorly and a supraocular spine posteriorly; occipital ridges with 2 pairs (or 4 pairs) of spines, space between them roughish, somewhat concave, with traces of a median keel; between these ridges, at occiput, a conspicuous transverse pit, broader than long, longer than deep; temporal ridges more prominent, each with 4 spines, last one very strong; a median row of minute spines on back and top of head; suborbital ridge extending from front of preorbital across cheek, with 2 or 3 irregular series of spines and tubercles, and ending in a strong preopercular spine; below this on preopercle 3 or 4 other bluntish spines; opercle with ridge and 1 or more spines; between 70 and 80 more or less developed spinous processes on head. Branchiostegal rays 6 (?); membranes united, joined to isthmus. Plates between occiput and first dorsal 7; between dorsals about 4 (number between the adjacent rays of the 2 fins not recorded). Anal region beginning under end of first dorsal; pectorals reaching eleventh plate, with minute spines at their base; ventrals short. Color dark brown, with 7 to 9 darker cross bars, extending on fins; one bar across caudal, 1 across posterior part of second dorsal and anal, 1 across posterior part of first dorsal and front of anal, and 1 across front of first dorsal; pectorals black with whitish edging and a pale blotch near base; other fins chiefly black, anal with whitish edge; ventral surface pale. Total length of known individuals reaches $4\frac{1}{10}$ inches. (Jordan & Gilbert.) Deep water off San Francisco, California; known only from the original type, taken in a parranzella or sweep net, near Point Reyes, 1880. (*vulsus*, beardless.)

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* Diagnosis: Body tapering, depressed throughout, height about $\frac{6}{7}$ of breadth, the latter 7 in length of body. Body spinous; only about 8 median plates on peduncle. Head 4; plates in dorsal series about 37 (number between last ray of second dorsal and first median plate not recorded; all others 34); between occiput and first dorsal 7; between membranes of dorsal 4. Gill membranes joined to isthmus. No teeth on vomer or palatines. Scattered barbels on maxillary, mandible, and branchiostegal membranes; a few on under side of snout, or none. One pair of horizontal and 1 pair of recurved spines on snout. One pair preocular, 1 pair supraocular, and 2 (or 4 ?) pairs of occipital spines. Dark brown, with 7 to 9 cross bars; fins mostly dark.

Agonus vulsus, JORDAN & GILBERT, Proc. U. S. Nat. Mus., III, 1880, 330, Point Reyes, near San Francisco. (Coll. Jordan & Gilbert.)

Podothecus vulsus JORDAN & GILBERT, Synopsis, 730, 1883; JORDAN, Cat. Fishes N. A., 114, 1885.

Stelgis vulsus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 821, pl. 90.

NOTE.—Allied to *Stelgis* and *Averruncus* is the single Antarctic genus, which may be thus defined:

AGONOPSIS, Gill.

Agonopsis, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167, 259 (*chiloensis*).

Body 8-hedral, peduncle 6-hedral; head depressed, its length a little more than 4, its width 5, and its depth in front of nape a little less than 7 in length of body. Jaws nearly equal, teeth on jaws and vomer, and an imperfect row on palatines. Two pairs of spines on snout, 1 pair preopercular, 1 pair supraocular, and 2 pairs occipital spines; a deep transverse depression at nape. Plates in dorsal series about 37; 7 pairs between occiput and first dorsal; plates of body with curved spines. Barbels under tip of snout, and scattered on chin and lower jaw, and sparingly on branchiostegal membrane. Gill membranes united, joined to isthmus. Antarctic. (*Agonus*; ὄψις, appearance.)

AGONOPSIS CHILOENSIS (Jenyns).

B. 6; 1 D. 8; 2 D. 7; A. 8; P. 14; V. 3 (1, 2); C. 2-11-2. Interorbital space concave, a little less than diameter of eye, with a pair of sharp minor longitudinal ridges terminating at a transverse groove behind eyes. Snout does not project beyond mouth; larger margin of suborbital with an irregular ridge formed of bluntish tubercles, the last terminating in a minute backwardly directed spine. Limb of preopercle with 3 diverging smooth ridges dilating at their extremities into 3 flattened blunt points; opercle with a smaller spineless ridge. Jaws about equal, the upper a little longer, with narrow bands of teeth; teeth on front of vomer and a short imperfect row on each palatine. Gill membranes not notched, attached to isthmus; gill openings large. Barbels short, on chin, lower jaw, and branchiostegal membrane (a pair also on under side of tip of snout in fig. 1, pl. 7). Temporal and occipital ridges present, formed of granulated tubercles (the occipital "tubercles" very plainly in the form of 2 pairs of spines in the figure); between occipital ridges a slightly raised longitudinal line; a deep transverse depression at nape. Temporal ridges end in a sharp point not prolonged into a spine. The carinated plates more sharply serrate than in *A. cataphractus*, the spines curved. (All the plates spinous from head to caudal in fig. 1, pl. 7.) Six slightly serrated scales forming on breast a somewhat triangular patch, 2 single ones standing first, the 4 others in pairs. Second and third rays of second dorsal largest; anal under second dorsal; pectorals rounded, 5 in length; ventrals scarely more than ½ of pectorals. Vent a little anterior to a line connecting the extremities of ventrals. Color in spirits, dusky gray above and on sides, paler below; a blackish transverse band under front of first dorsal, 1 under anterior and 1 under posterior end of second dorsal, 1 in middle of peduncle, and a trace of a fifth behind this; body mottled in places with blackish, and the fins, except ventrals, are of the same hue. (Jenyns.) Coasts of Chile and Patagonia. (*chiloensis*, living at Chiloe, an island off Patagonia.)

Aspidorphorus chiloensis, JENYNS, Zool. Voyage of the Beagle, Fish., 30, pl. 7, figs. 1, 1a, 1b, 1840, Chiloe, west coast of northern Patagonia (Coll. Darwin); GAY, Hist. Chil. Zool., II, 174.
Aspidophorus niger, KRÖYER, Ichth. Bidrag. Naturhist. Tidsskr. I, 238, 1844, Valparaiso.
Agonus chiloensis, GÜNTHER, Cat., II, 216, 1860. Valparaiso.
Agonopsis chiloensis, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 161.
Agonus niger, GÜNTHER, Cat., II, 215, 1860.

770. AVERRUNCUS, Jordan & Starks.

Averruncus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 821, pl. 91 (*emmelane*).

This genus is very close to *Stelgis*, with which it agrees in the rough armature, the presence of cirri on the gill membranes, and in other respects; differing in the presence of teeth on vomer and palatines; anal fin very long, of 11 rays; lower rays of pectoral exserted. North Pacific. (*Averruncus*, an averting demon, from the armed head.)

a. Snout rather long, the rostral spines protruding. EMMELANE, 2417.
aa. Snout shorter, the rostral spines scarcely protruding. STERLETUS, 2418.

2417. AVERRUNCUS EMMELANE, Jordan & Starks.

Head from tips of rostral spines, 4 in length of body; depth 7½. D. VIII or IX, 8; A. 11; P. 14; lateral line 35; orbit 4 in head; snout, to tips of rostral spines, 3⅛; maxillary 3¾; interorbital 6¼; pectoral 1⅗; second dorsal spine 2⅗; third dorsal ray 2⅓; longest anal ray 2⅗; caudal fin 2. Body elongate, subcylindrical, the caudal peduncle long and slender, very slightly depressed, about 3 plates in front of caudal fin it widens slightly and is compressed; belly somewhat prominent, breaking the otherwise straight vertical outline from chin to caudal fin; dorsal outline straight from occiput to caudal fin. Head, as viewed from above, almost regularly triangular, the prominent preopercular spines and the snout forming the angles, its dorsal profile irregular, much broken by spines. Mouth inferior, broadly U-shaped, maxillary reaching just past the vertical from front of orbit; lips thick, covered with short, fine papillæ; upper jaw protractile; teeth small, in villiform bands on the jaws, vomer, and palatines; the distance from the anterior edge of premaxillary to end of the rostral spines is less than ½ the length of snout; 2 cirri as long as pupil under rostral spines, anterior lower edge of preorbitals with cirri, a group of 3 cirri on end of maxillary, and a group of 4 or 5 on posterior end of mandible, 1 on the middle of each branchiostegal ray, these forming a line from isthmus to opercle, an area on chin from the mouth to the hyal bones that is "woolly" with short cirri; 2 or 3 on lower edge of opercle and interopercle. A pair of parallel rostral spines pointing forward, their tips covered with skin; behind them is a deep oval pit, on the anterior outer edge of which are a pair of spines that point upward and outward and are slightly hooked backward; at the posterior end of the pit are 2 spines, smaller than those above and slightly curved backward; a group of 4 short spines around anterior edge of eye and 1 large triangular spine over posterior edge; the interorbital space is deeply concave, with a low, sharp ridge on each side of the median line; preopercle very rough, with irregular spines and tubercles; middle of suborbital stay with a strong, hooked spine; below the stay, on the naked area, are 2 or 3 plates with spines on their centers; angle of preopercle with a large, sharp spine; along the lower edge of preopercle are 3 or 4 blunt spines; a ridge of 4 spines running back from each eye corresponding with the dorsal keels of body; below this on each side is a ridge, somewhat irregular, but not broken into spines, terminating in a spine that points between the dorsal and upper lateral keel of body; a small ridge on upper edge of opercle which does not end in a spine; a few small spines around posterior edge of opercle; a few minute spines along median line of top of head, the upper part of the eye covered with minute prickles. At the occiput is a deep pit, broader and deeper than long, divided by a low ridge through its middle. Body with 4 ridges on each side formed by the body plates, each plate ending in a strong recurved spine, except those of the abdominal ridge, which are smooth; a row of minute spines along median dorsal line from first dorsal to occiput; small spines following the lateral line; no trace of keels or spines in front of ventrals. The abdominal ridges widest apart on the belly, uniting on tenth plate in front of caudal fin; dorsal ridges uniting on ninth scale in front of caudal fin, but the spines continuing double to the tail; a row of sharp, small spines around the base of the pectoral and caudal fins; dorsal spines slender, the fins highest in front, the second spine the longest, its tip reaching to the base of the next to the last spine, where fin is depressed; last ray adnate by membrane to the back; third dorsal ray the highest, its tip reaching nearly to the last ray, where fin is depressed; the last ray is very short and adnate to the body for the whole of its length. Lower rays of pectoral fins produced, extending beyond the membrane, the longest extending beyond the upper ray of the fin; anal longer and lower than soft dorsal, ending at the same corresponding place, last ray reaching to the fifteenth plate before caudal fin; ventral differing in length in the different sexes; vent anterior, situated on the tenth plate in front of anal. Color dark brown, belly white; sides crossed with irregular white bars, giving the fish a mottled appearance; snout black; a black streak along lower edge of preoperele; a black spot on iris above; dorsals light, mottled with black; anal white, with dark mottlings, a dark bar across the posterior rays, the tips of all the rays white; ventrals black, abruptly white at tips; pectoral and caudal dark, with a white border, a light spot in the center of fins and many white spots on the rays; a black spot at base of pectoral. Puget Sound; known from 2 specimens, collected with a seine near Point Orchard, the largest 7 inches in length. (Jordan & Starks); another since taken at Port Ludlow. (*ἐν*, in; *μελάνη*, ink, from the dark colors.)

Averruncus emmelane, Jordan & Starks, Proc. Cal. Ac. Sci. 1895, 821, pl. xci, with plate, Port Orchard, near Seattle. (Coll. E. C. Starks. Type, 3135, L. S. Jr. Univ. Mus.)

2418. AVERRUNCUS STERLETUS, Gilbert, new species.

Head $4\frac{3}{5}$ in length; eye $3\frac{1}{4}$ in head, width at base of pectorals 7; depth $8\frac{1}{3}$. D. VII, 8; A. 9; P. 12 on each side; 39 plates in dorsolateral series. Very closely related to *A. emmelane*, with which it agrees in coloration and general appearance as well as in most details of structure. It differs in the following respects: The snout is shorter, the rostral spines scarcely protruding beyond the premaxillaries. No barbels on snout below rostral spines, or on margin of preorbital, or at mandibular joint. Region between rostral spine and front of premaxillaries wholly occupied by a triangular movable plate, with rough granular surface; breast with 3 parallel series of sharply keeled plates; no spine at posterior end of premaxillary fossa; ventrals very long and slender, wholly white; spinous dorsal, anal, and pectorals with fewer rays; rostral projection shorter than in *A. emmelane*, with 2 short forwardly directed spines, behind which is a pair more widely separated directed downward and backward; supraocular ridge elevated, not sharp, finely granular, with preocular and postocular spines; ridges and spines on head as in *A. emmelane*, but none of the former rough serrate. Eye large, longer than snout and more than twice the interorbital width. Mouth little overpassed by the rostral spines, the maxillary reaching slightly behind front of orbit, $3\frac{1}{6}$ in head. Teeth present on jaws, vomer, and palatine. Barbels fewer than in *A. emmelane;* 3 present on maxillary, 2 of which are at its posterior end, the upper much the longer; the third inserted more anteriorly behind the middle of the maxillary; 8 shorter barbels are present on each mandibular ramus, the posterior only near the joint; several short barbels on gular region, and a cross series on each branchiostegal membrane, usually 1 barbel for each ray. Plates on body as in *A. emmelane*, all with sharp spines, which are present though small in the ventral series; middle of breast with 1 median and 2 lateral series of plates, all of which bear distinct longitudinal keels; the 2 lateral ridges on breast being the anterior continuation of the ventral ridges of the trunk; spinous dorsal beginning at the seventh dorsal plate, the last dorsal spine articulating with the thirteenth plate; the first and last rays of the second dorsal articulate respectively with the eighteenth and twenty-fourth plates; the dorsal series unite at the thirtieth plate, the median series of 9 plates thus formed bearing double or bifid spines throughout; the first and the last anal rays articulating respectively with the sixteenth and twenty-third plates of ventral series (excluding the anterior 3 on breast); the ventral series coalescing immediately opposite the union of the dorsal series; the anus is opposite the interspace between the third and fourth plates; ventral spines long and slender, equaling length of snout and eye; pectorals equaling length of head in advance of opercular joint; five lower pectoral rays with incised membranes, the tips projecting. Color, similar to *A. emmelane*, the back and sides with 7 or 8 narrow black cross bars, the posterior of which extend faintly on the under surface; the interspaces on back are somewhat dusky, with lighter vermiculating lines and spots, a few of which extend on the bars; the dorsals have a speckled appearance and are darker when they lie above the black dorsal bars; head blackish above, the head and body light or slightly dusky below; ventrals white; anal white, with some black markings along the base of the rays; pectorals with a wide black bar at base succeeded by a wide white bar; then follow a narrower black bar and a narrow terminal white bar; caudal with a narrow basal bar of black, then a narrow white bar followed by a broad black bar and edged with white. Coast southern California, Coronado Island. The type, a specimen 4½ inches long, from *Albatross* Station 3662. (*sterletus*, sturgeon; a modern Latin word, probably derived from *Sturio*.) (Type in U. S. Nat. Mus. Coll. *Albatross*.)

Averruncus sterletus, GILBERT MS., off Avalon, Coronado Island, in 47 fathoms.

771. SARRITOR, Cramer.

Sarritor, CRAMER, in Jordan & Evermann, Check-List Fishes, 448, 1896 (*frenatus*).

Body tapering uniformly to base of caudal; head 4 to 4½, depth 6 to 8 in standard length. Plates on body nearly all without spines. Plates in dorsal series 38 to 45, 5 to 6 pairs between occiput and first dorsal. No large knife-like plate over eye. Both dorsal fins present, rather long, the rays growing shorter behind the last adnate to back. Four to 6 pairs of barbels about mouth, 1 pair under tip of snout. A pair of recurved spines near tip of snout. One pair of supraocular and 1 or 2 pairs of occipital spines. Teeth on jaws and vomer, none on palatines. Gill membranes joined to isthmus, without free fold; no barbels on gill membranes. Lower rays of pectorals with free exserted tips. Vertebræ 40 to 46. This genus is very close both to *Podothecus* and to *Odontopyxis*, differing from the former in the presence of vomerine teeth, and from the latter in the absence of a free median plate at the tip of the snout. Its relations to

Averruncus are still closer, the chief difference being in the smooth plates of the body and in the absence of cirri on the gill membranes. (*sarritor*, one that scrapes.)

a. Snout moderate, about ⅓ length of head; ventrals dark in male. FRENATUS, 2419.
aa. Snout very long, produced in a flat, triangular piece exserted for a distance equal to ⅔ orbit; ventrals pale. LEPTORHYNCHUS, 2420.

2419. SARRITOR FRENATUS,* Gilbert.

Head 4¼ to 4⅓. D. VI to VIII, 7 or 8; A. 6 or 7; P. 15; V. I. 2; C. 11, with a rudiment; lateral line 40. Body slightly depressed, tapering regularly backward from occiput, the depth about ⅞ of the width at base of pectorals. The ridges are prominent, the dorsal and dorsolateral ridges provided with strong spines, the ventral and ventrolateral series with weak or scarcely discernible spines, all decreasing in size backward, becoming obsolete on caudal peduncle. Dorsal face deeply concave anteriorly, its ridges coalescing, from 3 to 4 plates behind the dorsal fin; other faces much less concave, the ventral ridges coalescing, 3 or 4 plates behind the anal fin; plates in dorsal series 44 or 45; 5 or 6 pairs between occiput and first dorsal, 9 or 10 under first dorsal, 2 or 3 between dorsals, 7 or 8 under second dorsal, 17 or 18 behind dorsals; about 25 plates on breast, consisting of a strong median series which bear a well-marked rounded ridge, a strong lateral series at edge of breast also projecting, and a number of small plates occupying the concave intermediate areas. In young specimens the breast plates have central elevations, and bear each a backwardly directed spine; these disappearing in adults; a number of small irregular plates in front of and on base of pectorals; membranaceous intervals behind and around vent smaller than in *Podothecus acipenserinus*, occupied by 8 or 9 irregularly arranged plates, not in pairs and not corresponding to those of the ventral series between which they are intercalated; medial part of branchiostegal membrane and the gular region covered with roundish plates, the whole forming a halberd-shaped patch; lateral line running on a series of small plates occupying the middle of the lateral face; anteriorly these entirely disappear, the lateral line ascending and running on the upper lateral series; about 5 large plates, sometimes bearing spines, lie behind upper axil of pectorals, between this ascending portion of the lateral line and the inferior lateral series or plates; head depressed, tapering rapidly to the snout; depth of head at occiput ⅔ its width at preopercular spine, the latter contained 6⅓ times in length of body. Eye large, the orbit about equaling length of snout behind the serrated rostral ridge, 3½ to 3⅔ in head; snout somewhat variable in length, averaging ⅓ head. Supraocular ridges strong, rugose, ending in a short strong spine; an inner pair of ridges occupying floor of interorbital groove, very broad and closely joined anteriorly; the triangular space included between these latter ridges flat and opening posteriorly onto the depressed occipital area; occipital ridges low, rounded, ending in very strong spines which form the first of the dorsal series; 2 or 3 small rounded projections may occur on anterior ridges of the occipital spines; top and sides of head more or less closely beset with very fine prickles, which are most thickly clustered on occiput, interorbital area, upper part of opercles, suborbital chain, and sides of snout; a row of prickles on eyeball just above pupil; temporal ridge uneven, sometimes interrupted with a long, strong posterior spine; a strong spine, sometimes with an accessory tubercle on middle of cheek; preorbital with 2 pairs of spines placed vertically, the upper ones directed outward and upward, the lower spines directed downward and backward; rostral ridges rough, usually terminating posteriorly in a pair of spinous projections, which are located midway between tip of snout and front of pupil; anteriorly, at tip of snout, these ridges expand to form such a vertically projecting rounded spinous lobe, the posterior spine of which is much the strongest, and points backward and outward. In the very young the last-mentioned spines alone are present on snout, and are directed very obliquely backward; anteriorly ridges converge from them to tip of snout, and are very minutely serrulate; these ridges afterward increase in height and in strength of serrations, and become the spinous lobes already described; two strong diverging spines at angle of preopercle, and 2 rounded lobes below them. Three large plates and a number of smaller ones occupy cheek below suborbital stay. Posterior portion of mandible expanded into a rough projecting bony prominence. Mouth horizontal, overpassed by the snout in adults for a distance equaling ½ or less than ½ diameter of orbit; snout not noticeably projecting in the very young. Maxillary reaching slightly beyond front of orbit, equaling ½ length of snout and eye. Teeth in broad bands in jaws; a distinct patch on front of vomer, none on palatines. Branchiostegal membranes broadly joined, with a very narrow free fold posteriorly, or with none. Six pairs of barbels on under side of head; 1 on under side of snout in front of premaxillaries; 2 at end of maxillary; 1 near middle of maxillary; 1 on lower lip just below angle of mouth; 1 forked for ½ its length at middle of side of lower lip. In their distribution, relative lengths, and in the constantly bifid character of the last described, they correspond exactly with the barbels of *L. decagonus*, but the latter has apparently none on under side of snout. Interspace between dorsals somewhat variable, ¾ to ⅞ diameter of orbit. Anal beginning 2 plates in advance of second dorsal; pectorals 5½ in length of body, the lower rays graduated, 4 to 6 of the lower ones thickened, with exserted tips; ventral fins nearly twice as long in males as in females, in the latter less than diameter of orbit; caudal slender, 1¾ in head. Color light grayish or brownish, pale below; a bluish black stripe from ventral spines to front of orbit; suborbital, preopercle, and opercle with numerous dark spots;

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* Diagnosis: Body tapering uniformly from occiput to caudal, a little more slender than *Podothecus acipenserinus*, depth about ⅞ of width at base of pectorals, the latter 7⅖ to 7⅗ in length; head 4½. Plates in dorsal series 44 or 45; between occiput and first dorsal 5 or 6; between dorsals 6 or 7; from ventrals to anal 14 pairs. Six pairs of barbels, 1 on under side of snout in front of premaxillaries, 1 near and 2 at tip of maxillary, 1 at angle of mouth, and 1 at side of lower jaw. A pair of perpendicular serrated plates at tip of snout, behind these a curve nasal spine. One pair mesethmoidal, 1 pair supraocular, and 1 pair occipital spines. Teeth on jaws and vomer, none on palatines. Gill membranes joined to isthmus without free fold. Last ray of each dorsal shortened and adnate to the back. Light grayish with a few indefinite blotches and bars of darker on sides and back; pectorals with several narrow dark cross bands near base and broader ones toward tip.

a dark blotch on the side opposite middle of first dorsal; a faint dark bar under the anterior and a similar one under posterior part of second dorsal; both dorsals with indefinite oblique dark bands; pectorals dark except the lower proximal part, with narrow bars of black; ventrals light in female, dark in male; anal dark posteriorly; caudal dark, faintly barred. Coast of Alaska; known from *Albatross* Stations 3219, 3225, 3226, 3255, 3256, 3257, 3258, 3263, 3269, 3279, 3282, 3309, and 3330, located on both sides of the Peninsula of Alaska and both north and south of the Aleutian chain; depth 16 to 350 fathoms. (Gilbert); also obtained at Provostnaya, Kamchatka. (*frenatus*, bridled.)

Odontopyxis frenatus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 435, pl. 30, fig. 3, Alaska and Aleutian Islands, at Albatross Stations 3215, 3219, and others, in 16 to 351 fathoms.

2420. SARRITOR LEPTORHYNCHUS (Gilbert).

Head 4 in length; snout 2⅗ in head in specimen 100 mm. long. Eye 3½, equaling length of maxillary; interorbital with ⅔ eye. Branchiostegal membranes broadly united, extensively free laterally, joined to isthmus mesially to extreme posterior margin, or leaving a very narrow margin free. Teeth present on jaws and on vomer, none on palatines. Dorsal VI to VIII, 6 or 7; anal 6 or 7; pectoral 14; ventral I, 2; pectorals long, reaching to or beyond middle of spinous dorsal, as long as snout and eye; ventrals equaling length of snout. Very close to *S. frenatus*, with which it agrees in arrangement of plates, spines on head, and barbels; distinguishable at once by the elongate slender snout and differing in the following numerous details: The body is somewhat broader and more depressed, its greatest depth a little less than ⅔ its greatest width, which occurs across preopercular spines. The body narrows rapidly backward to below spinous dorsal, as in young *S. frenatus* of the same size. Compared with *S. frenatus* of the same size, the plates on body are much less spinous, the superior and inferior lateral and the ventral series in some specimens bearing spines on a few of the anterior plates only, and the spines of dorsal series are lower. Five plates before dorsal, 10 under spinous dorsal, 2 between dorsals, 7 under second dorsal, and 16 on caudal peduncle. The inferior lateral ridges rise anteriorly, greatly constricting the lateral face under anterior part of spinous dorsal. It then descends slightly and becomes almost or quite obsolete, the series of plates ending behind the upper pectoral rays. In *S. frenatus*, the constriction of the lateral face does not occur, the ridge is strongly marked anteriorly, and ends below middle of pectoral base. In *S. leptorhynchus* we have, therefore, a much narrower interval between the anterior ends of the upper and the lower lateral series. This interval is occupied by but 3 plates, arranged in a series, decreasing in size backward. The upper preopercular and the humeral spines are much larger than in *S. frenatus*, the former greatly overpassing the second spine. The rostral spines are similar, but the terminal plate roughened but not serrate, the posterior spine not detached. Snout greatly produced into a narrow triangular piece which overpasses the mouth, for a distance equaling ⅔ diameter of orbit in a specimen 100 mm. long. In specimens of *S. frenatus* of this length the ends of the rostrum can barely be seen from below. A few prickles present on upper side of rostrum, and the usual series above pupil. Minutely serrated ridges on sides of snout, and 1 below eye. No prickles on top or sides of head. Plates on branchiostegal membranes and on gular region smaller and more numerous than in *S. frenatus.* Twenty plates on breast, without spines, or the young with very small ones. Color darker than in *S. frenatus,* the under parts unmarked anteriorly, dotted posteriorly with brown; upper parts dark brown in spirits, with 6 or 7 more or less distinct black bands, which are margined narrowly with lighter; a black streak forward from eye, and several black spots and blotches on sides of head; caudal blackish; soft dorsal dusky, obscurely marked with lighter; spinous dorsal black, sharply blotched with pure white; ventrals and lower pectoral rays white, the upper part of pectorals with obscure bars of black. Coast of Alaska. A few specimens from *Albatross* Stations 3215, 3219, 3259, and 3267, north and south of the Alaskan Peninsula, in 32 to 59 fathoms. (Gilbert.) (*λεπτός*, slender; *ῥύγχος*, snout.)

Odontopyxis leptorhynchus, Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 437, Bering Sea, north of Alaska Peninsula, at Albatross Station 3267, lat. 55° 23′ 30″ N., long. 163° 29′ W. (Type, No. 48727. Coll. *Albatross.*)

772. XYSTES, Jordan & Starks.

Xystes, Jordan & Starks, Proc. Cal. Ac. Sci. 1895, 824 (*axinophrys*).

This genus is allied to *Averruncus*, differing in its shorter vertical fins, the rays of both dorsals being subequal, the last of each not much shortened and not adnate by membrane to the skin of the back; the lower rays of the pectoral progressively shortened; plates on body very rough, the spines strong; a strong knife-like spine above eye; no barbels; no pit at the occiput. North Pacific. (*ξύστης*, one that scrapes.)

2421. XYSTES AXINOPHRYS, Jordan & Starks.

Head 3½ in length of body; depth 5. D. IX, 8; A. 10; pectoral 15; lateral line 38; orbit 4 in head; snout to tip of rostral spines 3⅙; maxillary 3⅙; interorbital 3½; pectoral 1½; highest dorsal spine 2½; highest dorsal ray 2; highest anal ray 2¾; length of caudal fin 1⅔. Body elongate, subcylindrical, deepest and broadest at shoulders; belly prominent; dorsal outline straight from first dorsal spine to caudal fin, curved up anteriorly to occiput. Head very irregular, much broken by large spines; mouth inferior, rather broad, maxillary reaching to the vertical from front of orbit; lips thin, not broken up into papillæ; upper jaw protractile; teeth small, in villiform bands on jaws, vomer, and palatines; the anterior edge of premaxillary directly under the base of rostral spines; a few very small blunt papillæ behind chin, a barbel at end of maxillary, not ½ so long as diameter of pupil. A pair of sharp rostral spines pointing forward and upward; behind these a pair of curved spines pointing upward, outward, and backward; between these and behind the rostral spines an almost circular pit which is entirely occupied by the upper end of the premaxillary process; interorbital wide and concave, a slight median ridge, running from the rostral pit to a point above pupil, each side of which is an outwardly curved ridge ending in a minute spine; over each eye is the largest spine on the head or body; the large triangular orbital spine, its base occupying nearly the whole space above eye, sharp and strongly hooked back; on the anterior part of its base a small, sharp, preorbital spine, pointing upward; a series of minute spines, running medially along the top of the head and body, from a point between the orbital spines to the first dorsal spine; on each side of these are 2 large blunt spines with traces of a smaller one between them, continuous with the dorsal keels of body; farther down and continuous with the upper lateral keel of body is a ridge broken up into 4 irregular spines, larger than the body spines; 4 triangular spines on edge of preopercle, the upper one the largest; a very irregular ridge running from upper preopercular spine, under eye, to snout; a ridge on upper part of opercle. Body with 4 ridges on each side, formed by the scales, each of which ends in a spine; traces of a ridge between lateral ridges, the spines on abdominal ridges as sharp as those on rest of body; a Y-shaped ridge of spines in front of ventrals, the forks toward the ventrals and the base ending at gill membrane; a raised area between ventral fins, running from their base to their tips, which is entirely covered with small prickles, the anus in the posterior end of this; dorsal and abdominal ridges coalescing with their fellows of the opposite side, but coming together so gradually that it is impossible to tell exactly where they unite as the spines continue distinct to the caudal fin. Small spines covering the outer part of the base of the pectoral; a ring of spines around caudal base; occiput abruptly higher than body, but scarcely forming a pit as body is about level behind it. Spinous dorsal highest in front, the second spine reaching to base of last spine when fin is depressed; the dorsal rays subequal in length, the last not shortened and not adnate to body, last ray reaching to the tenth plate before caudal fin; pectoral fin posteriorly rounded in outline, the lower rays not produced, reaching to second plate before anal fin; ventrals small, reaching just past vent; anal longer and lower than soft dorsal; dorsal and anal ending at the same corresponding place; caudal fin rounded behind. Color in spirits, gray with 7 or 8 dark cross bars; head uniform gray with the exception of a dark spot at occiput; belly dusky; dorsals somewhat mottled; anal black with a white spot near its middle; pectorals white with a large black spot on base of rays; ventral black, abruptly white at tips; caudal black, edged with white. Puget Sound. One specimen, 1½ inches in length, dredged at Port Orchard, near Seattle. (Jordan & Starks.) Another since taken at Port Ludlow. (ἀξίνη, an ax; ὀφρύς, eyebrow.)

Xystes axinophrys, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 824, pl. 92, Port Orchard, Admiralty Inlet. (Coll. E. C. Starks.)

773. BATHYAGONUS, Gilbert.

Bathyagonus, GILBERT, Proc. U. S. Nat. Mus., XIII, 1890, 89 (*nigripinnis*).

Spinous dorsal developed; lower jaw the longer; plates of body spinous; gill membranes united to isthmus, not forming a fold across it; teeth well developed on jaws, vomer, and palatines; pectorals not notched, the upper rays longest, the lower becoming regularly shortened; bones of head thin and yielding, the system of mucous canals very strongly developed. Deep-sea Agonoids. (*βαθύς*, deep; *Agonus.*)

2422. BATHYAGONUS NIGRIPINNIS,* Gilbert.

B. 6; 1 D. 6 to 8; 2 D. 6 or 7; A. 7 to 9; P. 15 or 16; V. 3 (I, 2); C. 1–11–1; vertebræ 11 + 34 = (45). Pyloric cæca 5 (1 individual). Body depressed throughout, depth ⅘ of width, the latter 9⅗ in body length; sharply octagonal, tail strongly depressed hexagonal, its lateral faces very narrow. The ridges compressed; the small sharp spines present on all the ridges from head to caudal except on the median ventral series of peduncle and the first few plates behind the pectoral in the imperfect lateral series. One to 3 pairs of plates between last ray of second dorsal and first median plate, and 1 or 2 pairs between last anal ray and first median plate; 1 or 2 plates in front of and 4 or 5 small, sharply spinous plates on base of pectorals; about 22 plates, radially striate, elevated at the center, some of the strongest minutely spinous, on breast in a median and 2 lateral rows (the latter continuous with the ventrolateral series) and in the ridge-like rows forming the edges of breast; no plates medially on posterior part of the branchiostegal membrane or laterally on the anterior part; from 1 to 3 or 4 well-developed plates on front part of lower side of lower jaw; the membranaceous interval behind vent, between the ventrolateral series, occupied by about 5 to 9 plates, partly arranged in pairs; none between ventrals and vent. Head 4⅘ to 5 in body, much depressed, its greatest depth ⅘ of its greatest width, the latter equaling width of body; snout broad, flat, shovel-like, nearly equal to long diameter of orbit; orbit oblong-oval, its vertical diameter ⅗ of the longitudinal, the latter 3 or a little less in head; interorbital space concave, about as in *triacanthus*, but broader, with a pair of minor longitudinal ridges, about 9 in head, about 2 in vertical diameter of orbit; the moderate supraocular ridges ending in a sharp spine, the scarcely developed occipital ridges with 2 pairs, of which the anterior is low and blunt; the well-developed temporal ridge with 2 or 3 small spines and terminating in a larger suprascapular spine; bridge across cheek close under orbit with about 1 spine on preorbital, 3 on suborbital, and ending in 1 on preopercle; 1 of about the same size below the last on preopercle. Cheek below ridge with 2 to 4 (usually 3) spinous plates; nasal spines small, sharp, directed backward; movable median rostral plate small, varying in size and shape (disappearing with the prolongation of lower jaw), its lateral expansions usually free, as spines; 3 small upright diverging spines (only 2 systematically placed in 1 specimen). Mouth oblique, lower jaw somewhat protruding, maxillary scarcely reaching front of orbit. Teeth moderate, present on jaws, vomer, and palatines. Two barbels, 1 large and the other small, at tip of maxillary, none on lower jaw, the mucous pores bordered by lobed flaps. Gill membranes broadly united, joined to isthmus, without free fold. Dorsal fins well separated; anal beginning about 3 plates in front of beginning of second dorsal; pectorals $5\frac{5}{6}$ in body, their base $3\frac{1}{4}$ in their length, with 15 or 16 graduated rays, the uppermost longest; ventrals of male nearly 3 in head, about equal to long diameter of orbit, those of female $\frac{5}{7}$ to $\frac{5}{6}$ as long as those of male; caudal about 3 times as long as wide at base. Lateral line with 43 or 44 pores; plates spineless, rather large. In a young male 2 inches long the median rostral plate is absent, all the plates on breast sharply ridged and spinous; vent near tip of ventrals, $\frac{1}{4}$ of the distance from ventrals to anal, with 5 pairs of minute spinous plates between ventrals and vent. Body not tapering uniformly; broader in front, narrowing abruptly near front of first dorsal; tail not so much depressed; head $3\frac{1}{2}$ in body length. Color light above, blue black on under side of head; breast and belly dusky; all the fins intensely blue black. Pacific; known from the Aleutian Islands, Bering Sea, south to coast of Washington; abundant in 350 to 477 fathoms. Here described from Dr. Gilbert's types. Dr. Gilbert observes:

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* Diagnosis: Body slender, tapering uniformly, depressed throughout, its depth ⅘ of its width at base of pectorals. the latter 9⅗ in length; head 4⅘ to 5 in length. Plates in the dorsal series 43 or 44; between occiput and first dorsal 7 or 8; between dorsals 6, sometimes 7; between ventrals and anal 13 to 15 pairs. Lower jaw protruding; 2 barbels at tip of each maxillary; median rostral plate present, with 3 small diverging spines; nasal spines small, separate; 1 pair supraocular and 2 pairs occipital spines. Gill membranes joined to isthmus. Under side dusky, lighter above; all the fins blue black.

> In adult specimens the lower pectoral rays show a tendency to elongate, as in *Xenochirus*, but the fin is never distinctly notched. The lower jaw always strongly protrudes, and the genus differs further in the very thin cranial bones and the inordinate development of the mucous system. In addition to the specific characters mentioned in the original description, we note that the eyeball does not exhibit the usual row of prickles and that 2 barbels are usually present at end of maxillary, either black or white in color. The majority of the specimens were obtained north of Unalaska Island, but it was also taken south of the Islands, and off the coast of Washington, at *Albatross* Stations 3210, 3316, 3324, 3325, 3329, 3330, 3331, 3337, and 3343; depths 109 to 483 fathoms.

(*niger*, black; *pinna*, fin.)

Bathyagonus nigripinnis, GILBERT, Proc. U. S. Nat. Mus. 1890, 89, Aleutian Islands and coast of Washington. (Coll. *Albatross*.)

774. XENOCHIRUS, Gilbert.

Xenochirus, GILBERT, Proc. U. S. Nat. Mus. XIII, 1890, 90 (*triacanthus*).

Spinous dorsal present. Jaws equal or the upper the longer. Plates of body spinous. Gill membranes united to isthmus, the posterior edge sometimes forming a very narrow free fold across throat. Tip of snout with a movable median plate or spine. Teeth well developed on jaws, vomer, and palatines. Pectorals divided by a deep notch into 2 portions, the lower composed of greatly thickened rays which are simple and frequently longer than those of the upper lobe, these lengthened rays not usually developed in the young. A series of small spines on eyeball above pupil. North Pacific. This genus is very close to *Bathyagonus* which represents it in deeper water. Both are near *Odontopyxis*, but the relation to *Averruncus* and *Sarritor* is more remote. (ξενός, strange; χείρ, hand.)

a. Rostral plate with 3 upright spines.
  b. Breast with numerous plates. PENTACANTHUS, 2423.
  bb. Breast smooth; plates of body rougher. ALASCANUS, 2424.
aa. Rostral plate with 1 upright spine.
  c. Gill membrane with posterior free fold. LATIFRONS, 2425.
  cc. Gill membrane without posterior free fold. TRIACANTHUS, 2426.

2423. XENOCHIRUS PENTACANTHUS,* Gilbert.

B. 6; 1 D. 5 to 7; 2 D. 5 to 7; A. 6 to 8; P. 14 or 15; V. 3 (I, 2); C. 1–12–1; vertebræ $12 + 28 = (40)$. Pyloric cœca 5 (1 individual). Body 8-hedral, slightly depressed; peduncle considerably depressed, hexagonal, the lateral faces narrow. Spines of body small and sharp, projecting backward nearly parallel with axis of body, decreasing gradually in size from head to caudal in the dorsolateral and superior lateral series, poorly developed on the inferior lateral series only from behind the pectoral to opposite front of anal, entirely absent from the ventrolateral series. Plates on breast, 2 pairs in front of ventrals, followed anteriorly by 3 median single plates; on each side of these a longitudinal row of 4 or 5 smaller plates, continuous with the ventrolateral series; outside of these the plates forming the edge of the breast. Branchiostegal membrane posteriorly with 3 or more very weak plates medially, or none at all; none on the membranes laterally; 2 or 3 fairly developed ones in front part of under side of lower jaw; the membrane behind vent studded with several poorly developed plates, none between ventrals and vent. Head as in *X. latifrons*, but more depressed and slender; snout not quite so short, blunt; greatest depth of head ⅔ of its width, the latter 7 in length of body; orbits large, oval, their longitudinal diameter 2½ in head; a slightly curved row of 4 or 5 backwardly directed small spines on eyeball just above pupil; interorbital space deeply concave, with minor ridges very narrow, about 3⅓ in long diameter of eye, 9 in head; a single pair of supraocular spines; the poorly developed occipital ridges with 2 pairs of spines, of which the anterior is very low and blunt; temporal ridges moderate, terminating in a blunt spine; the interrupted ridge across cheek less prominent and shelf-like than in *X. latifrons*, bearing 1 spine (sometimes 2) in front of anterior inferior angle of orbit, 1 or 2 on suborbital, and a single broad flat spine (sometimes preceded by a very small one) at posterior edge of preopercle; cheek below ridge entering into ventral surface of head with a longitudinal series of 3 or 4 plates; nasal spines sharp, far apart; median rostral plate small, movable, variable, its lateral expansions exposed as spines and with 3 (in 1 specimen 4) diverging spines directed upward and backward; not projecting beyond premaxillaries; maxillary reaching very little beyond front of orbit, entirely covered by preorbital. Jaws equal; teeth on jaws, vomer, and palatines. Two barbels at tip of each maxillary; those on under side of mandible inconstant; occasionally a very small pair near tip of jaw, at the 2 ends of the terminal mucous pore; another at edge of next mucous pore nearly constant, but very variable, long, short, or only a small pimple, single, double, or even a pair on each side; occasionally a very small one at edge of third pore. Dorsal fins separated by a moderate space; first dorsal with 5 to 7, usually 6 spines; anal begins 2 or 3 plates in front of second dorsal; pectorals $6\frac{1}{5}$ in length of body, their base 3 in their length, the lower 5 or 6 rays exserted, separated from the upper by a notch in the adult, the 2 or 3 uppermost of the exserted rays sometimes longer than the longest upper rays; ventrals of female a little less than long diameter of orbit, $\frac{2}{3}$ as long as in male; caudal 3 times as long as wide at base; lateral line 39 to 41; pore plates thin, weak, spineless. Color olive brownish, pale below, with 5 faint cross bars, 1 beneath first dorsal, 1 between dorsals, 1 beneath posterior part of second dorsal running up on fin, 2 on peduncle; these bars often indistinct or absent; a blackish blotch in axil; caudal black, narrowly edged with white; dorsals dusky, darker toward tips, second dorsal narrowly white-edged; pectorals dusky; short, black streaks on rays forming indefinite cross bars, those at base aggregated into a blotch; ventrals light in both sexes. Length 7 inches. Deep waters of North Pacific, Bering Sea to San Diego, in 70 to 339 fathoms. Here described from Dr. Gilbert's types. (πέντε, five; ἄκανθα, spine.)

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*Diagnosis: Body slightly depressed, its depth a little less than its width, tapering moderately, and the tail tapering more gradually toward the caudal; width of body at base of pectorals 7 in length; head 4½; plates in dorsal series 39; from occiput to first dorsal 7 or 8, between dorsals 5 or 6, from ventrals to anal 12 or 13 pairs; barbels 2 at tip of maxillary, those on lower jaw inconstant, usually 2 pairs. Median rostral plate small, nearly vertical, with 3 upright spines; nasal spines prominent, separated; 1 pair of supraocular and 1 pair of occipital spines. Teeth on jaws, vomer, and palatines; gill membranes joined to isthmus without free fold. Brownish olive above, pale below; 4 or 5 dusky cross bars on back.

Xenochirus pentacanthus, GILBERT, Proc. U. S. Nat. Mus. 1890, 91, Bering Sea and off San Diego. (Coll. *Albatross*.)

2424. XENOCHIRUS ALASCANUS, Gilbert.

Head $4\frac{1}{2}$ to $4\frac{5}{6}$ in length; width of head equaling or slightly exceeding length of snout and eye. Depth of body equaling length of snout and $\frac{1}{2}$ eye. Fin rays in 8 specimens as follows:

	Spinous dorsal.			Soft dorsal.		Anal.	
Rays	V.	VI.	VII.	6.	7.	7.	8.
Specimens	1	4	3	6	2	7	1

Pectoral 15 or 16. Ventral I, 2. Lateral line 39 or 40. A decided pit behind the eyes, and a deep transverse nuchal depression, the two separated by the prominent occipital region. Snout of moderate length, much depressed behind the spines, $3\frac{2}{5}$ to $3\frac{3}{5}$ in head. Eye 3 in head in adults. Interorbital space wider, much more deeply concave, the supraocular ridges very heavy, minutely roughened, ending posteriorly in robust spines. Rostral spines as in *X. pentacanthus*. A small apical plate bearing 3 small diverging spines, behind which are 2 longer ones. Preorbital with a small spinous point directed backwards. A spine posteriorly on bony bridge across cheek. Below this bridge, the cheek is entirely mailed by 3 rounded plates which bear no spines, except in the young, and so intimately joined that the sutures are difficult to discover. In *X. pentacanthus* the plates are much smaller and do not entirely cover the cheeks, leaving soft areas surrounding them; the 2 posterior plates in this species also bear spines. Maxillary $3\frac{3}{5}$ in head, barely reaching front of orbit. Teeth on jaws, vomer, and palatines, the usual row of 5 or 6 prickles on eyeball. Preopercle with 3 diverging spines at angle, a rounded lobe beneath them; spines and ridges otherwise as in *X. penta-*

canthus, but stronger and rougher; 3 or 4 strong plates present on gular membrane; a few weak ones or none on branchiostegal membrane mesially. Two barbels at tip of each maxillary, and a pair, often double, on under side of mandible arising from the margin of the anterior pair of mandibular pores. The symphyseal pore has its margin sometimes provided with very short barbel-like elevations. Space between dorsal ridges very deeply concave in front of dorsal fins; the single ridge behind dorsal fins provided with very short, scarcely preceptible, double spines; lower lateral series of plates continued forward to axil of pectorals, becoming indistinct in *X. pentacanthus;* ventral series anteriorly with few short spines or none, this series strongly spined in *X. pentacanthus;* plates on breast arranged alike in the 2 species, but in *X. alascanus* they are more finely striate, and bear neither spines nor raised centers, except in very young examples. In *X. pentacanthus* the elevated centers may or may not bear short spines. Seven plates before dorsal, 8 or 9 under spinous dorsal, 2 or 3 between dorsals, 7 or 8 under soft dorsal, 13 or 14 behind dorsals. Distance from snout to nape equaling or slightly exceeding that from nape to first dorsal. Front of anal under end of spinous dorsal or slightly behind that point, more anteriorly placed than in *X. pentacanthus*. Ventrals 2⅓ to 2⅔ in head. Lower pectoral rays produced, with incised membranes as long as head behind rostral spines. Color lighter than in *X. pentacanthus*, more or less finely speckled above, usually with 5 or 6 dusky cross bars on back; a series of linear dark blotches below the lateral line; head often finely speckled with brown, and showing traces of a brown bar forward from eye to snout; dorsals, caudal, and upper half of pectoral light, finely speckled with brown, the caudal shaded with dusky; ventrals and anal white. Most nearly related to *X. pentacanthus* with which it agrees in having a rostral plate bearing 3 spines and in the absence of a free fold to branchiostegal membranes. It differs conspicuously in the broader head, with its much heavier spines and ridges, in the presence of deep postocular and nuchal pits, in the smooth breast and cheeks, in adults in the different coloration and fin rays, and in many other different details. Aleutian Islands; taken rather abundantly in the vicinity of Unimak Pass, both north and south of the islands, at depths of 56 to 138 fathoms. (Gilbert.) Taken by us off Karluk. (*alascanus*, pertaining to Alaska.)

Xenochirus alascanus, Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 438, Unimak Pass Aleutian Islands. (Coll. *Albatross*.)

2425. XENOCHIRUS LATIFRONS,* Gilbert.

B. 6; 1 D. 6 or 7; 2 D. 7; A. 7 or 8; P. 14 or 15; V. 3 (I, 2); C. 1–11–1; vertebræ 12 + 29 = (41). Body as deep as wide, 8-hedral; caudal peduncle depressed, 6-hedral. The thin, sharp, curved spines present on all the ridges; on the dorsolateral and superior lateral series, from head to caudal; on the inferior lateral series, from opposite front end of first dorsal to base of caudal; and on ventrolateral series, from base of pectorals to a short distance in front of anal; 2 pairs of plates between last ray of second dorsal and first median plate, and 2 pairs between last anal ray and first median plate; about 23 oval, striated plates with raised centers on breast; no plates on branchiostegal membrane; 2 or 3 anteriorly on under side of mandible; a small plate or none in front of pectorals. Membrane behind vent with 6 to 9 small plates arranged in pairs, none between ventrals and vent. Head depressed, its depth $\frac{7}{9}$ of width, the latter (across preopercles) 7 in length of body; snout short, blunt. Orbits large, oval, the vertical diameter $\frac{2}{3}$ of the longitudinal diameter, the latter $2\frac{1}{2}$ in head; 3 to 5 small, backwardly directed spines in a slightly curved line on eyeball just above pupil. Interorbital space very narrow, 7 in head, deeply concave, with 2 minute longitudinal ridges. Supraocular ridges with 1 spine, the poorly developed occipital ridges with 2, of which the anterior is much the smaller; the interrupted suborbital ridge close under orbit, well developed, with 2 spines on suborbital and 1 on preopercle; no plates on lower part of cheek, which enters ventral surface of head; nasal spines sharp, far apart; median rostral plate small, its lateral expansions embedded in the skin, a single, small, median, curved, upright spine. Maxillary reaching slightly beyond front of orbit; lower jaw a very little included; well developed teeth in several rows on jaws, vomer, and palatines. A single long barbel at tip of maxillary; a small pair at ends of the terminal mucous pore, near the tip of lower jaw, and another just behind this at the edge of the next pore, the former sometimes, the latter frequently, bifid or a pair on each side. Dorsals fairly separated; second dorsal higher than first; anal beginning about 1 plate in front of second dorsal; pectorals $6\frac{1}{2}$ in length of body, their base nearly 3 in their length, with 14 or 15 rays, the lower exserted, separated by a notch from the upper rays in adult, the 3 or 4 uppermost of these as long as or longer than the longest upper rays; ventrals of female a little less than long diameter of orbit, $\frac{2}{3}$ as long as those of male; caudal broad and short, its width at base a little more than 2 in its length. Lateral line with 39 or 40 pores; the plates small, spineless. Color, dusky olive, light below, the back with 5 or 6 faint darker cross bars; axillary region blackish, soft dorsal and caudal with the rays black; spinous dorsal with a conspicuous jet-black margin; pectorals somewhat dusky above; ventrals pale in both sexes. Total length reaches $7\frac{1}{2}$ inches. Deep waters of the North Pacific; coast of Oregon to San Diego and outward; abundant in 50 to 204 fathoms. Here described from Dr. Gilbert's types. (*latus*, wide; *frons*, forehead.)

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* Diagnosis: Body slender, tapering uniformly from head to caudal; depth equaling width, the latter at base of pectorals 8⅓ in length; head 4¾. Plates in dorsal series 37 to 40; between occiput and first dorsal 6, occasionally 7; between dorsals 4 or 5; from ventrals to anal 13 or 14 pairs. One large barbel at tip of maxillary, 1 pair near tip of lower jaw, at edges of terminal mucous pore, and 1 at edge of next pore. Median rostral plate present, with a single upright spine. Nasal spines prominent, separated; 1 pair supraocular and 2 pairs occipital spines. Teeth in jaws, vomer, and palatines. Gill membranes joined to isthmus, with narrow free fold behind. Dusky olive, paler below; 5 or 6 indistinct dark cross bars; spinous dorsal with black margin.

Xenochirus latifrons, GILBERT, Proc. U. S. Nat. Mus. 1890, 92, off Coast of Oregon and off San Diego. (Coll. *Albatross.*)

2426. XENOCHIRUS TRIACANTHUS,* Gilbert.

B. 6; 1 D. 5 or 6; 2 D. 6 or 7; A. 6; P. 13; V. 3 (I, 2); C. 1-11-1. Body depressed throughout its length, sharply octagonal, peduncle hexagonal; the sharp, delicate spines present on all the ridges from head to caudal, except the first few plates on the inferior lateral, and on the ventrolateral from a short distance in front of anal to caudal; one pair of plates between last ray of second dorsal and first median plate (the first 3 median plates sometimes each with a pair of closely approximated spines) and 1 pair between last anal ray and first median plate; about 25 radially striated plates on breast, 5 or 6 small ones on posterior part of gill membranes in front of breast, 1 on each side anteriorly, and 3 or 4 well-developed plates on front part of under side of mandible; intervals between ventrolateral behind vent with 12 to 15 small plates, mostly in pairs, none between ventrals and vent. Head more depressed and elongate than in *X. pentacanthus* and *latifrons*, its depth $\frac{4}{5}$ in width, the latter $8\frac{2}{5}$ in length of body; snout elongate triangular, nearly equal to long diameter of orbit. Orbits oval, the vertical $\frac{3}{4}$ of the longitudinal diameter, the latter 3 in head; a slightly curved row of 3 to 5 spines on eyeball above pupil. Interorbital space narrow, concave, without minor ridges, 9 in head. Supraocular ridges ending in a sharp spine; occipital low, with 2 pairs of spines, of which the anterior is low and blunt. Temporal moderate, ending in a sharp suprascapular spine; suborbital ridge moderate, close under orbit, with 1 spine on suborbital and ending in 1 at edge of preopercle; below the latter spine, another, broadly triangular; 3 or 4 well-developed spineless plates on lower part of cheek, which enters into ventral surface of head; nasal spines strong, sharp, far apart; median rostral plate small, movable, slightly overhanging, premaxillary (its lateral expansions as free spines) bearing a single upright spine; lower jaw a little included, maxillary not reaching orbit. Barbels probably varying much, for they differ markedly on the 2 sides of the jaw in the single specimen examined. Dorsals well separated; anal beginning about 1 plate behind the beginning of second dorsal; pectorals $5\frac{3}{4}$ in length of body, their base $\frac{3}{10}$ of their length, with 13 rays, the 4 lower exserted, separated from the rest by a notch, the 2 upper of these 4 longer than any of the other rays; ventrals of male $2\frac{1}{4}$ in head (in female probably shorter); width of caudal at base $2\frac{1}{3}$ in its length. Color olivaceous, with traces of darker cross bars on back, fins light or somewhat dusky, rays dark; ventrals pale in both sexes. Description taken from Dr. Gilbert's type. Total length reaches 7 inches. Coast of California to coast of Oregon, in 47 to 204 fathoms; a specimen also taken off Point Reyes in 75 fathoms. (*τρεῖς*, three; *ἄκανθα*, spine.)

Xenochirus triacanthus, GILBERT, Proc. U. S. Nat. Mus. 1890, 91, coast of California, at Albatross Station 2893, in 145 fathoms; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 827, pl. 93.

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* Diagnosis: Body tapering uniformly from head to caudal, its depth $\frac{4}{5}$ of width at base of pectorals, the latter $8\frac{1}{2}$ in length; head 5 or a little less. Plates in dorsal series 39; between occiput and first dorsal 7; between dorsals 5; between ventrals and anal 15 pairs. Two barbels at tip of each maxillary, 1 pair at edge of the terminal mucous pore on under side of mandible, 1 at edge of next pore, and 1 at edge of third pore. Median rostral plate with a single upright spine. Nasal spines prominent; 1 pair supraocular and 2 pairs occipital spines. Teeth on jaws, vomer, and palatines. Gill membranes joined to isthmus, without free fold. Olivaceous, with traces of darker cross bars; fins light, the rays darker.

775. ODONTOPYXIS, Lockington.

Odontopyxis, LOCKINGTON, Proc. U. S. Nat. Mus., II, 1879, 328 (*trispinosus*).

Body very slender, depressed, tapering uniformly from head to caudal; head 3⅓ to 4½, the width of body 6 to 7, depth 6 to 8 in length of body. A deep pit behind occiput with a longitudinal ridge in its bottom; plates in dorsal series 35 to 40; both dorsal fins present; 4 (3) rays in first, 6 (7) in second; teeth numerous on jaws, vomer, and palatines. Gill membranes broadly joined to isthmus, without free fold; a single upright spine on median rostral plate; supraocular spines small, sharp; 2 pairs of blunt occipital spines or tubercles. (ὀδούς, tooth; πύξις, box.)

2427. ODONTOPYXIS TRISPINOSUS,* Lockington.

B. 6; 1 D. 4 (occasionally 3); 2 D. 6 (occasionally 7); A. 5 to 7; P. 14; V. 3 (I, 2); C. 1–11–1 (sometimes 1–10–1); pyloric cæca 5 to 7 (1 or 2 very small; 3 individuals). Body octagonal, the faces a little concave; spines small, sharp, present on the dorsolateral and superior lateral series nearly from head to caudal; a few very weak ones on inferior lateral; none on ventrolateral series; about 3 long, sharp spines on each side of base of caudal on the terminal plates. Two or 3 pairs of plates between last ray of second dorsal and first median plate, and 1 or 2 pairs between last anal ray and first median plate; 18 to 20 quite large, radially striated plates on breast, 6 or 7 of varying size in front of, and several minute spinous ones on base of pectorals; 3 or 4 strong plates on median part of gill membranes posteriorly, 1 to 3 on each side in front, 3 or 4 on under side of jaw, so that the whole of under side of head is well armored; 1 or 2 plates between ventrals and vent, the latter surrounded by small tubercles. Head somewhat depressed, its depth $\frac{7}{10}$ of its width, the latter 7 in length of body; orbits nearly circular, the longitudinal diameter about 3⅔ in head; a few minute spines on eyeball above pupil; snout pointed, equal to orbit; interorbital space concave, narrow, $\frac{5}{9}$ of longitudinal diameter of eye; occipital and temporal ridges weak. A deep transverse pit behind occiput, broader in front, its bottom divided longitudinally by the cranial ridge above the foramen magnum; suborbital ridge moderate, 1 spine on preorbital, and a very blunt flat one at posterior edge of opercle; 1 or 2 blunt flat projections below the latter spine; opercle with a ridge and 3 to 7 or 8 minute spines or prickles along its posterior border. Cheek below suborbital ridge entering into ventral surface of head, with 2 or 3 well-developed plates; several small plates in a longitudinal series behind orbit, above suborbital and preopercle, the highly movable median rostral plate with a single upright spine, its lateral expansions free, in form of small spines, slightly overhanging premaxillaries. Jaws equal, maxillary reaching front of orbit. Dorsals well separated; anal beginning about 1 pair of plates behind front of second dorsal; pectorals 5⅓ to 5½ in length of body, the base about 3 in their length, with 14 rays, of which the lower 5 to 7 are exserted, the depth of the notches in the membrane variable, the 2 or 3 uppermost of these exserted rays nearly as long (sometimes as long) as the longest upper rays; ventral fins of female about twice the interorbital space, about ⅔ of the ventrals of male; width of caudal at base 3 in the length. Lateral line 36. Color olivaceous, with 7 or 8 darker cross bars—1 in front of first dorsal, 1 under and extending into middle of first dorsal, 1 under front, and 1 under hind end of second dorsal, and 3 or 4 on caudal peduncle; a large bluish-black blotch on preopercle and opercle; first dorsal dark, the distal ⅓ white; second dorsal with 2 minute indefinite cross bars of darker; caudal dark at base, a broad dark band near its distal end, and the tip broadly white-edged; pectorals light, indistinctly cross-barred by series of dark streaks on the rays; ventrals pale in both sexes. Length about 3 inches. Coast of California, from Puget Sound to Santa Barbara; rather common in 11 to 57 fathoms. Here described from specimens taken off Point Reyes, where it is abundant. One specimen recorded by Lockington (loc. cit.) as having come from Alaska. (*tres,* three; *spinosus,* spined.)

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*Diagnosis: Body tapering uniformly from head to caudal, depressed, its depth about $\frac{5}{6}$ of its width (at base of pectorals), the latter 7 in length of body. Head 4½; a deep pit behind occiput, with a longitudinal ridge in its bottom. Plates in the dorsal series 35 to 37; between occiput and first dorsal 6 (occasionally 7) pairs; between dorsals 5 (occasionally 6); between ventrals and anal 12 or 13 pairs; teeth numerous on jaws, vomer, and palatines. One small barbel at tip of maxillary; gill membranes broadly joined to isthmus, without free fold. Median rostral plate with a single upright spine; nasal spines separated; supraocular spines small, sharp; 2 pairs of occipital in the form of low, blunt tubercles. Color olivaceous, with 6 or 7 darker cross bars.

Odontopyxis trispinous, LOCKINGTON, Proc. U. S. Nat. Mus., II, 1879, 328, San Francisco, California (Coll. W. N. Lockington); JORDAN & GILBERT, Synopsis, 729, 1883; JORDAN, Cat. Fishes N. A., 114, 1885.

776. BOTHRAGONUS, Gill.

Bothragonus, GILL MS., in JORDAN & GILBERT, Synopsis, 728, 1883 (*swanii*).

Head and front of back rhombic as seen from above; body strongly compressed behind; length of head 3, width of head 2⅞, depth of body about 4⅗ in standard length. A deep pit at nape, several processes extending into it from its posterior edge. Mouth subinferior; posterior edge of opercle serrated. Both dorsals and anal weak, with short rays; anal under second dorsal; first dorsal 3; second dorsal 5; anal 3; no spines anywhere. Teeth on jaws and vomer (state of palatines not mentioned). Gill membranes broadly united to isthmus. (*βόθρος*, a pit; *Agonus.*)

2428. BOTHRAGONUS SWANII (Steindachner).

B. 5; D. III, 5; A. 5; P. 12; V. 3 (I, 2); lateral line 32. Head widening rapidly backward from the blunt snout, with 4 broad, low (occipital and temporal) ridges, between which the surfaces are concave. Body narrowing rapidly from head to beginning of first dorsal, from there to caudal strongly compressed. A deep transverse oval pit on mid-dorsal surface between occiput and nape; 3 delicate larger and several smaller processes extending into it from its posterior edge to about its middle. Length of head 3, its greatest breadth (over opercles) about 2⅞; depth of body under first dorsal about 4⅗, from the occipital pit to base of ventrals a little more than 3 in length of body. Interorbital space slightly more than $\frac{1}{4}$ of head; snout 4; width of mouth about $3\frac{1}{4}$, orbit about $5\frac{2}{3}$ in head. Snout rounded anteriorly, longitudinally arched, rising knob-like before the flat forehead, and extending a little beyond mouth, the latter broader at its angles than long, these a little in front of middle of eye. Teeth on jaws and vomer in several series, very small, conical, blunt at tips; plates on cheeks raised into tubercles; posteriorly the transversely flattened forehead is separated by a slightly curved, very low ridge from the occipital region; plates surrounding the occipital pit in part large and polygonal; last plate of head, above posterior end of opercle, extending outward as a broad, low pyramid; small bony plates embedded in skin on underside of head; preopercle spineless; edge of opercle scalloped and serrated. First dorsal beginning about middle of body; space between dorsals equaling distance from center of eye to tip of snout; spines of first dorsal but little shorter than rays of second dorsal; both dorsals and anal rounded; caudal about 2 in head, slightly rounded; base of large pectoral reaching to ventral surface, its longest ray $1\frac{3}{5}$ in head; ventrals some distance behind pectorals, about 2 in the latter; distance between base of ventrals and front of anal a little more than the head; anal pit some distance behind base of ventrals. Plates of lateral line flat, those of remaining series considerably larger and elevated at their centers, forming 4 series of blunt processes or ridges; 14 pairs of plates between ventrals and anal, 5 between hinder edge of occipital pit and first dorsal (6 from occiput to first dorsal); 7 between second dorsal and caudal; ventral surface narrowing rapidly from head to anal and anteriorly convex, posteriorly flat. A blackish-gray cross band surrounds the head, wreath-like, its outlines indefinite in places, passing transversely across forehead and from lower edge of orbit completely around edge of mouth; band under first dorsal passing obliquely forward to near insertion of ventrals; the next band falling between the dorsals, and the third under second dorsal; both are vertical; pectorals with a narrow dark cross bar at base and a much broader marbled one occupying nearly the whole distal half of fin; ventrals with 3 or 4 bands of dark spots; on both dorsals and anal oblique cross bars of dark spots; caudal with numerous cross bars of dark spots, which increase in intensity of color distally and flow together and leave isolated spots of lighter; ground color of body light yellowish with a tinge of brownish. Length of the single specimen 1 inch 11 lines; found dead on the beach after a storm. (After Steindachner.) The following points may be added from the 4 excellent figures: The ventrolateral series lie entirely on ventral surface of body anteriorly and meet in front of vent; 2 pairs of plates between ventrals and vent; a single plate between bases of ventrals, 4 plates in pairs in front of them on breast, and these preceded by 2 single plates; 10 or 12 rather small plates in about 3 rows in front of base of pectorals; several plates on lower part of cheek and a longitudinal series of them behind orbit, above suborbital and preopercle. Puget Sound; known from single specimen. This species has been erroneously referred to the genus *Hypsagonus,* because of its short compressed body and peculiar form of head.

A very careful comparison of the description and the excellent figures with *Odontopyxis trispinosus*, Lockington, with which Steindachner was probably not acquainted, makes it evident that in spite of its aberrant form, the *Hypsagonus swanii* is more closely related to it than to any other known species. There is in reality no point of resemblance to *H. quadricornis* except the shortness of the body and the compressed condition of its posterior part. In all of the following points, some of which Steindachner mentioned as differences between his species and *H. quadricornis, B. swanii* agrees with *O. trispinosus:* Both dorsals and anal small; the distance of the first dorsal from nape and the distance between dorsals (measured by the number of plates); the deep pit at nape; position of vent, with 1 or 2 pairs of plates between it and the base of the ventrals; 2 or 3 series of small plates between base of pectoral and gill opening; small plates on gill membranes and lower jaw; the longitudinal series of small plates behind orbit; the coloration, etc. The only known specimen was less than 2 inches (50 mm.) long and was doubtless a young one. The most marked characters which distinguish *B. swanii* from *Odontopyxis* are the shortness of the body, the wideness of the body in front, and the compression of the tail; all are characters which distinguish the young from the adult in all species of the family in which the young have been seen and described, except that here these characters seem exaggerated. (Named for James G. Swan, of Port Townsend, Washington, a veteran observer and collector.)

Hypsagonus swanii, STEINDACHNER, Ichth. Beiträge, v, 144, pl. 4, Sitzb. der Akad. Wiss., LXXIV, July, 1876, Port Townsend. (Coll. James G. Swan. Type in Coll. Mus. Vienna.)
Bothragonus swanii, GILL, in JORDAN & GILBERT, Synopsis, 728, 1883; JORDAN, Cat. Fishes N. A., 114, 1885.

777. ASPIDOPHOROIDES, Lacépède.

Aspidophoroides, LACÉPÈDE, Hist. Nat. Poiss., III, 228, 1802 (*tranquebar=monopterygius*).
Canthirhyncus, SWAINSON, Nat. Hist. Fishes, etc., II, 272, 1839 (*monopterygius*).
Anoplagonus, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 259 (*inermis*).
Ulcina, CRAMER, in JODRAN & EVERMANN, Check-List Fishes, 449, 1896 (*olriki*).

Body and head more or less slender; head 4 to 6, width 5 to 8 in length of body; 8 longitudinal rows of plates, the lateral line in the upper lateral row; about 40 plates in the dorsal series. Terminal rostral plate present, unarmed; mouth terminal; teeth on jaws, vomer, and palatines. Supraocular and occipital spines absent; plates of body more or less keeled, without spines. First dorsal absent; second dorsal and anal small, opposite each other, each with 4 to 7 rays. Gill membranes united, narrowly joined to isthmus anteriorly, free behind. (*ἀσπίς*, shield; *φορέω*, to bear; *εἶδος*, form.)

ULCINA (*ulke*, a sculpin, in Danish):
- *a.* Body rather robust, the depth about 5 in length, the head 4 in length; plates in lateral line usually less than 40.
  - *b.* Lateral line with 40 plates; nasal spines well developed. OLRIKI, 2429.
  - *bb.* Lateral line with 36 to 38 plates; nasal spines very small or obsolete. GUNTHERI, 2430.

aa. Body very slender, the depth about 8 in length, the head 5 to 6; plates in lateral line more than 40.

c. Nasal spines present; no median dorsal row of plates behind occiput.

ASPIDOPHOROIDES:

d. About 48 (or fewer) plates in dorsal series; temporal ridge ending posteriorly in a slight elevation. Atlantic coast. MONOPTERYGIUS, 2431.

dd. 49 or 50 pairs of plates in dorsal series; temporal ridge not ending posteriorly in a slight ridge. Pacific coast. BARTONI, 2432.

ANOPLAGONUS (ἄνοπλος, unarmed; *Agonus*):

cc. Nasal spines absent; a median dorsal row of small plates from occiput halfway to dorsal. INERMIS, 2433.

Subgenus ULCINA, Cramer.

2429. ASPIDOPHOROIDES OLRIKI, Lütken.

D. 6 or 7; A. 6 or 7; P. 13 or 14; V. 3 (I, 2); C. 10 (Lütken). Form short and thick compared with *A. monopterygius*, depressed anteriorly, posteriorly narrower and somewhat angular. Nape and fore part of back concave; forehead strongly arched antero-posteriorly. Interorbital space concave, supraorbital ridges high. Ventral surface flat. Greatest breadth, over opercles, ¾ of length of head, the latter 4⅕ to 4½ in total length, its greatest height, at shoulder, ⅔ of length of head. One pair of nasal spines; a single barbel at angle of mouth (at tip of maxillary, as in other *Aspidophoroides*,) overlooked in the original description. Pectorals large, about as long as head; other fins small; all rays simple; anal under dorsal, about midway between head and caudal; ventrals inserted a little behind base of pectorals. Eyes large, their diameter ⅓ or a little less in length of head, longer than snout. Mouth small, its angle in line with anterior edge of orbit. Vent large, lying with its surrounding naked area about 2 pairs of plates distant from base of ventrals. Gill membranes united. Eight longitudinal rows of plates on body, 6 on tail. In dorsal series 36 to 38, the posterior 12 or 13 on tail, median unpaired; in front of dorsal, 14 to 16 pairs. Superior lateral (lateral line) series 36 to 38; inferior lateral series 35 to 37; on breast 12 to 14, paired and unpaired. Two unpaired plates between vent and ventrals (from ventrals to anal about 12 pairs). Teeth on jaws, vomer, and palatines. Fin rays, dorsal 6, anal 6, in 3 individuals, 5 in each fin in the fourth individual (6 or 7 in each fin in the Greenland specimens); pectorals 13 to 15 (in 2 specimens, 14 in 1 fin and 15 in the other); ventrals 3 (I, 2); caudal 10 or 11, the eleventh very short. Color more uniform dark gray on back than those previously described (a few very indefinite dark cross bands); a large dark patch on preopercle and opercle seems to be quite constant; the dark spots on pectorals and caudal form cross bands when the fins are folded; tips of dorsal, anal, and ventral fins in general white, but the white patch is wanting in 1 specimen, which is paler than the others, has a smaller head and shorter ventrals. This is undoubtedly a female; the others males. Holm's notes on the color of the newly caught specimens say, "Sides of back greenish, with brown markings, otherwise whitish." Arctic Ocean; known from west coast of Greenland, Davis Strait, at 32 fathoms; our specimens from Godhavn, Kara

Sea, at 55 fathoms; Barents Bay, Nova Zembla. (Eu.) The Dutch expedition took 15 specimens of this form in Barents Bay and probably confused it with *A. monopterygius*. Their length was 40 to 75 mm. Later, on the *Fylla* expedition, Holm took 9 specimens in Davis Strait on the whitefish banks north of Holstenborg at a depth of 32 fathoms. Their length varied from 62 to 86 mm. The dark color bands in these are more or less distinct, at least among the smaller specimens. The ventrals varied a little in length, those with the short ventrals apparently in a decided minority. The small barbels were present in all of them. Rays of dorsal and anal fins: D. 6; A. 6 (3 specimens); D. 6; A. 7 (1 specimen); D. 5; A. 6 (1 example); D. 6; A. 5 (1 example); D. 7; A. 6 (3 examples). That the white patch on the dorsal (and anal and ventral) is invariably present on the individuals with longer ventrals is undeniable. The assumption that it is a sexual distinction of the male thus gains probability; this was demonstrated in the specimens that were opened. Total length 63 to 69 mm. (4 individuals). (Lütken.)

Aspidophoroides olriki, LÜTKEN, Forelöb. Meddel. om Nord. Ulkefiske; Vidensk. Meddel. Naturhist. Foren. Kjöb. 386 (with 3 figures), 1876, Greenland; JORDAN, Cat. Fishes N. A., 113, 1885; LÜTKEN,* Kara-Havets Fishe, 6, pl. 15, figs. 1–3, 1886; specimens from Kara Sea.

2430. ASPIDOPHOROIDES GUNTHERI, Bean.

D. 7; A. 7; V. I, 2; C. 10; P. 12. Body short, anteriorly very wide, somewhat depressed. Height of body 6, and its width 5 in its length; head 4⅛, its depth not more than ½ of its width, the latter nearly 5 in length of body; triangular, very short, wide posteriorly. A small barbel at tip of each maxillary; teeth in jaws, vomer, and palatines; nasal spines almost invisible. Along sides of head inferiorly 4 large mucous pores in oblong depressions, the largest of which is nearly as long as snout. Eye 3 in head, considerably more than width of interorbital space. Maxillary not reaching beyond anterior border of orbit; mandible barely included; snout equaling interorbital space, the latter deeply concave. Greatest width of head nearly 5 in length of body, and 2 from beginning of dorsal to base of caudal. Gill membranes narrowly attached to isthmus anteriorly, free posteriorly; gill opening wide. A deep groove along anterior third of back. Pectorals 2½ times as long as ventrals and 4 in length of body; ventrals as long as head without postorbital part; vent nearer tips than bases of ventrals; beginning of dorsal nearly midway of total length; anal under dorsal but a little shorter; length of caudal 5½ or 6 in length of body; second dorsal ray longest, equal to postorbital part of head; longest anal ray less than ¼ of head. Lateral line 40. Plates on breast about 14. Color dusky above, whitish below; a dark stripe on snout, continued on opercle; a few indistinct dark blotches on side of head; axillary region dusky; pectoral with 3 or 4 imperfect cross bars; body with 3 indistinct dusky cross bars, the middle one extending on middle of dorsal fin; tail with 2 dusky bars, 1 anteriorly, the other terminal, with a dirty yellowish area between them; ventrals and anal pale. Probably a young individual. Longest known individual, which served as the type, was 70 mm. (about 2⅘ inches). (Bean.) Coasts of northern Alaska. (Named for Dr. Albert Günther, keeper of the British Museum of Natural History.)

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* The following is the substance of Dr. Lütken's original account from specimens from Greenland: Body short, thick, total length 72 to 75 mm.; head 4½ in total length (including caudal fin); width of body (at base of pectorals) a little more than 5 in total length; angles of body not distinctly serrated; interorbital space and back concave; nasal spines 2; diameter of orbit 3 in head, nearly twice the width of interorbital space or length of snout; plates in dorsal series 35 to 37; in front of dorsal fin 14 to 17; superior lateral series 39; inferior lateral 37; ventrolateral 36; in front of anal 12 or 13. First dorsal fin absent; teeth present on vomer and palatines; only 8 longitudinal series of plates, the lateral line on the superior lateral series; the ventrolateral series not forming the inferior angles of the body, but confined to the ventral surface and meeting in a single plate between ventrals and vent.

The above diagnosis, made in 1875 from the Greenland specimens taken from the stomachs of flounders, was not accompanied by a detailed description. The description was made ten years later from specimens taken in the Kara Sea. The figures of the individuals from Kara Sea differ from the figures of specimens from Greenland in several respects. On the former the anterior part of the back just behind the nape is more elevated; the rostral spines are directed much more backward and seem much less prominent; and there is 1 less median plate on breast (this last difference an individual one in other species). The gill membranes are probably free, at least behind.

Aspidophoroides güntheri,* Bean, Proc. U. S. Nat. Mus. 1885, 74, northern Alaska (Type, No. 37032. Coll. Lieut. G. M. Stoney); Jordan, Cat. Fishes N. A., 113, 1885.

2431. ASPIDOPHOROIDES MONOPTERYGIUS † (Bloch).

(Sea Poacher.)

Br. 6; D. 5 or 6; A. 5 or 6; P. 9; V. 3 (I, 2); C. 10 or 11; Pyloric cæca 4 or 5 (2 individuals). Width of body at base of pectorals 8 in length; dorsal face concave from occiput to dorsal; ventrolateral ridges fairly prominent, but these series lie entirely on ventral side of body anteriorly and converge to a single plate between ventrals and vent. The ridge of the inferior lateral series, instead of disappearing anteriorly, is lower down than usual, becomes prominent anteriorly and runs to lower end of base of pectorals, thus forming the inferior angle of body, which is markedly 4-hedral in front. Plates in dorsal series 46 to 48; between ventrals and anal 16 or 17 pairs; between last ray of dorsal and first median plate 1 to 3 pairs; 2 or 3 pairs between last anal ray and first median plate. A small plate between ventrals, a larger one between ventrals and vent; a variable number (3 to 8) of small plates behind and beside vent; plates of breast radially striate, the two median ones larger than the rest; a few small plates on hinder median part of gill membranes, and on narrow under side of mandible; 2 large plates with raised centers in front of and

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* This species agrees with the measurements of *A. olriki*, Lütken, and with the coloration as far as it is possible to judge; it differs from *A. olriki* only in these recorded characters: The nasal spines are very small, the longest anal ray is shorter than in the figures of *A. olriki*, and the pectoral rays number 12, while they range from 13 to 15 in *A. olriki*. But in none of these respects does it differ more from Lütken's descriptions and figures of *A. olriki* from Greenland and from Kara Sea, in some respects apparently less, than these differ from each other. Each of the localities is about ⅓ of the earth's circumference from the other, and *A. guntheri* may be only a variety of *olriki*, which would then be a circumpolar species; if this view should ultimately prove untenable, Lütken's Kara Sea specimens will have nearly as good a claim to specific distinction as the type of *A. guntheri* has.

† Diagnosis: Body very slender, depressed in front, nearly 4-hedral anteriorly; depth ⅔ of width, the latter 8 in length; caudal peduncle very long, 6-hedral subterete; head long, tapering forward, 5⅔ to 6 in length of body; plates in dorsal series about 48; between occiput and dorsal fin 19 to 21; from ventrals to anal 16 or 17 pairs; first dorsal absent; barbels none; gill membranes free; median rostral plate small, unarmed. Nasal spines very strong, diverging; no other spines on head or body. Color, brownish, obscurely banded with dark.

4 to 8 small spineless plates in 1 or 2 series on base of pectoral. Head long, tapering, 5⅔ to 6 in length of body; orbits very large, nearly circular, the longitudinal diameter longer than snout, 3½ in head; interorbital space wide, less than orbit, deeply concave; supraocular ridges high, bulging; occipital ridges evident; temporal ridges low, terminating in an upwardly directed blunt elevation; suborbital ridge close under orbit, low, spineless, 2 or 3 plates below it on the nearly vertical cheek; median rostral plate small, immovable or slightly movable, spineless, overhanging premaxillary; mouth small, terminal, lower jaw a little included; maxillary reaching front of orbit, almost entirely covered by preorbital. Dorsal and anal fin small, the latter under the former; caudal 3 times as long as wide at base; pectorals 6 or less in body, their base about 5 in their length; ventrals of female ⅗ those of male, the latter ⅗ of pectorals. Lateral line 50. Color brownish, pale below, with indefinite cross bands of darker, 2 in front of, and 1 under dorsal, and 2 or 3 on caudal peduncle; rays of dorsal and upper rays of pectoral brownish, interrupted by lighter, giving an indefinite cross-banded appearance; caudal dark, ventrals in both sexes and anal pale. Total length 6 inches. Greenland to Cape Cod; common in rather deep water. This description based on specimens from Massachusetts Bay. (*μόνος*, single, *πτερύγιον*, fin.)

Cottus monopterygius, BLOCH, Ichthyologia, II, 156, pl. 178, figs. 1, 2, 1786, Tranquebar; an error.

Cottus indicus, BONNATERRE, Tableau Encycl. Meth., 68, pl. 87, fig. 367, 1788, India; after BLOCH.

Aspidophoroides tranquebar, LACÉPÈDE, Hist. Nat. Poiss., III, 228, 1802 Tranquebar; after BLOCH.

Aspidophoroides grœnlandicus, VALENCIENNES, in CUVIER, Régne Anim., Ed. II, Vol. 2, pl. 21, fig. 3, 1829, Greenland.

Aspidophoroides monopterygius, CUVIER & VALENCIENNES, Hist. Nat. Poiss., VI, 554, pl. 169, 1830; STORER, Fishes of Mass., 22, pl. 1, fig. 1, 1867; DE KAY, New York Fauna: Fishes, 62, pl. 3, fig. 5, 1842; GÜNTHER, Cat., II, 216, 1860; JORDAN & GILBERT, Synopsis, 724, 1883.

Canthirhyncus monopterygius, SWAINSON, Nat. Hist. of Fishes, etc., II, 272, 1839.

2432. ASPIDOPHOROIDES BARTONI, Gilbert.

Very close to *Aspidophoroides monopterygius*. From this species it differs in the much lower ridges on body, which are slightly rounded rather than sharply carinate, and leave the intervening faces shallowly concave, instead of deeply so. The plates of the lower lateral ridge do not in the young bear backwardly directed spinous points as they do in *A. monopterygius*. The keel in front of the ventral fin, prominent in *A. monopterygius*, is here nearly or quite obsolete. The same is true of the keel below the eye, and the occipital ridge. The plates in front of the pectorals also protrude less, and in general the angles and prominences are less marked. The space between the dorsal ridges is less, its greatest width being ½ length of head behind middle of eye in adults, and behind posterior margin of eye in young. In *A. monopterygius* the same width equals ½ head behind front of eye in adults, behind middle of eye in young. These scarcely admit of quantitative statements, but are sufficiently evident on comparing specimens from the Atlantic and the Pacific. Vertebræ

11 + 39 = 50. General proportions, fin rays and color are the same in the 2 species. Aleutian Islands; taken very abundantly both north and south of the Aleutian Islands and in Bristol Bay, at depths of 17 to 121 fathoms. (Gilbert.) Also found about the Pribilof Islands. (Named for Mr. Barton A. Bean.)

Aspidophoroides bartoni, GILBERT, Rept. U. S. Fish. Comm. 1893 (1896), 434, Aleutian Islands; Bristol Bay, Alaska. (Coll. *Albatross*.)

Subgenus ANOPLAGONUS, Gill.

2433. ASPIDOPHOROIDES INERMIS,* Günther.

B. 6; 1 D. absent; 2 D. 5 or 6; A. 4 or 5; P. 10; V. 3 (I, 2); C. 11; vertebræ 11 + 32 = 43. Pyloric cæca 4 (1 individual). Only 8 longitudinal rows of plates, the lateral line in the upper lateral row. No spines anywhere on body; no ridges on the superior and inferior lateral series; plates of the dorso- and ventrolateral series bent upon themselves at right angles, forming the 4 prominent angles of the body; the ventrolateral series do not therefore lie entirely on underside of body, as in *A. monopterygius*, nor do they converge between ventrals and vent, but pass forward to lower end of base of pectorals; three pairs of plates between last dorsal ray and first median plate, and 2 to 4 pairs between last anal ray and first median plate; a median dorsal series of hexagonal plates about as large as those of the lateral series, on widest part of back, from occiput to about halfway to dorsal; these plates alternating, but not regularly, with still smaller ones; an inconstant number of small plates behind and around vent; 2 or 3 pairs between ventrals and vent, and a single small one between the bases of ventrals. Gill membrane medially on its posterior part and laterally on its anterior part and narrow under surface of mandible between the rami strongly plated; two or 3 large plates in front of and 7 to 10 small ones in 2 series on base of pectoral. Head depressed, its depth ¾ of its greatest width; orbit small, circular, less than snout, 4½ in head; interorbital space narrow, 1⅖ of orbit, moderately concave; supraocular, occipital, temporal, and suborbital ridges very low; 4 or 5 plates on lower part of cheek; median rostral plate small, vertical, movable, unarmed; mouth small, the lower jaw slightly projecting, maxillary scarcely reaching front of orbit, entirely covered by preorbital; teeth in bands on jaws, vomer, and palatines. Dorsal and anal fins small, the latter under the former, with usually 5 rays; caudal rounded, its width at base 2½ in its length; pectorals 7 in length of body, their base 2½ to 3 in their length, nearly truncate, with 10 rays, the 3 lowermost a little exserted. Ventrals of female nearly twice as long as orbit, ⅚ to ¾ as long as those of male, the latter less than 2 in pectorals. Lateral line 41. Color dark (nearly black) grayish or brownish and lighter gray, dusky below; a black band from mouth across orbit to pectoral and alongside of body, much interrupted; dark markings deepest on sides of body; a dark cross band halfway between occiput and dorsal, 1 in front of dorsal, 1 under posterior half of dorsal (running up on latter), and about 2 on caudal peduncle; posterior half of dorsal dark, marbled; a marbled patch at base of pectorals, another on their distal third; ventrals pale in both sexes; anal with dark patches on or behind the rays, darker posteriorly; caudal black at its base and on its distal half, the 2 patches connected by a black band along middle of fin, leaving 2 light patches on the dorsal and ventral thirds of the proximal half of the fin; the bands of color very much as in *A. monopterygius*, but better defined. Length 4 inches. Coast of Alaska, south to Vancouver Island; not abundant; recorded from Vancouver Island (Günther); eastern Aleutian Islands, 34 to 59 fathoms, and Bristol Bay. (Gilbert.) Here described from specimens from the Aleutian Islands and Bristol Bay. (*inermis*, unarmed.)

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* Diagnosis: Body slender, much depressed anteriorly, 4-hedral, the dorsal face concave, the ventral flat, the lateral convex; caudal peduncle 6-hedral, subterete; depth of body ⅔ in width, the latter 8 in length; head long, tapering, 5¼ in length of body; plates in dorsal series 42; from occiput to dorsal 19 to 21; from ventrals to anal 17 pairs; a median dorsal row of small plates from occiput to opposite tip of pectorals; first dorsal absent; barbels none; gill membranes narrowly joined to isthmus with moderate free fold behind; median rostral plate small, unarmed; nasal and all other spines absent from head. Color brownish black, with several alternating cross bars of darker and lighter. Pectorals with black patch at base and 1 near tip.

Aspidophoroides inermis, GÜNTHER, Cat., II, 524, 1860, Vancouver Island; LÜTKEN, Forelöb. Medd. om Nord. Ulkefiske; Vidensk. Meddel. Naturhist. Foren. Kjöb., 385, 1876; JORDAN & GILBERT, Synopsis, 725, 1883; JORDAN, Cat. Fishes N. A., 113, 1885.

Anoplagonus inermis, GILL, Proc. Ac. Nat. Sci. Phila., XIII, 1861, 167.

Family CLXXXII. CYCLOPTERIDÆ.*

(THE LUMP SUCKERS.)

Body short and thick, more or less elevated, covered with a thick skin, which is smooth, tubercular, or spinous; head short and thick; suborbital

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* Dr. Gill thus defines the superfamily *Cyclopteroidea*, including the *Cyclopteridæ* and the *Liparididæ*, the group being equivalent to that called by other writers "*Discoboli*":

"Acanthoptergians with the third infraorbital bone developed as a stay obliquely crossing the cheek and connecting with the preoperculum, the myodome suppressed, the post temporal bifurcate and normally connected with the cranium, the actinosts enlarged and mostly connected with the inner ridge of the proscapula, the hypercoracoid being dislodged upward and the hypercoracoid downward on a row with the 4 actinosts; ribs sessile on the vertebral centra or hæmapophyses; pharyngials reduced to the large epipharyngeal (homologous with the third of typical Acanthoptergians), and ventrals modified to form a suctorial disk supported by 6 immovable rays on each side converted into osseous tissue and without articulations; typically suppressed. They appear to have the branchial apparatus constructed on the same plan as in the *Cottoidea;* 2 or 3 basibranchials ossified; hypobranchials of 3 pairs in line with the corresponging ceratobranchials of fourth arch suppressed; ceratobranchials of all and epibranchials (of all or 3) arches well developed; pharyngobranchials reduced to 1 pair of compressed epipharyngeals; hypopharyngeals divergent and rather compressed. There are 3½ gills, that is double branchiæ, on all the arches except the fourth, which has a single row of filaments. There is no fissure behind the fourth arch." (Gill.)

Mr. Garman (Monograph of the Discoboli, 1892, 19) has the following remarks on the *Cyclopteridæ:*

"Anteriorly the form of the lump fishes is stout, thick, and deep; behind the body cavity, which occupies the greater portion of the length, it rather abruptly becomes weak and slender. The head is short and broad, subquadrangular in transsection; the snout is short and blunt; the mouth is of moderate width, anterior, and opens slightly upward; the teeth are small, subconical, and arranged in a band or cord; the eyes are of medium size and have a lateral outlook. All of the members of the family have pseudobranchiæ, 3½ gills, 6 branchiostegal rays, small gill openings, numerous pyloric cæca, and an elongate intestine. In their lower portions the broad, rounded pectorals extend forward under the throat, along the sides of the disk. The vertical fins are not of large extent; the caudal and the 2 dorsals are quite separate. The disk is comparatively large. Early in life the skin is tender and naked; later it grows tough and is covered with roughened or spine-bearing osseous tubercles. Semicartilaginous describes the skeleton with tolerable accuracy; the small amount of bony matter lies in thin plates, often forming cells and chambers similar to those to be noticed in the bones of *Lophius*. The third stay present, thin and flattish; mouth small, terminal; jaws with bands of slender, simple teeth; no teeth on vomer or palatines; gill openings narrow, restricted to the sides, the membranes being broadly joined to the isthmus and shoulder girdle; branchiostegals 6; gills 3½; pseudobranchiæ present; dorsal fins 2, the anterior part of flexible spines, which, in the adult, are sometimes hidden by a fleshy hump, in 1 subfamily entirely wanting; soft dorsal usually opposite the anal and similar to it; caudal fin rounded, free from the dorsal and anal; ventrals thoracic, rudimentary, forming the bony center of a sucking disk; pectorals short, placed low, their bases broad and procurrent; pyloric cæca numerous; intestine elongate; vertebræ 12 + 16, the skeleton feebly ossified. Genera 7; species 8; inhabiting the northern seas of both hemispheres. By means of the adhesive ventral disk these fishes are enabled to attach themselves very firmly to rocks or other objects. They feed on crustacea, worms, small fishes, and plants. The young of *Cyclopterus* bear a close resemblance to *Liparis*, an evidence of the common origin of the 2 groups, which is borne out by the anatomy. (*Discoboli;* group *Cyclopterina*, GÜNTHER, Cat., III, 154 to 158.)

CYCLOPTERINÆ:
I. Spinous dorsal present, sometimes concealed in adult.
  a. Barbels none; disk anterior, below the head.
    b. Skin armed with large tubercles.
      c. Larger tubercles on body in rows well separated; spinous dorsal fin obsolete with age. CYCLOPTERUS, 778.
      cc. Larger tubercles not in rows, crowded closely together; spinous dorsal fin usually not disappearing with age. EUMICROTREMUS, 779.
    bb. Skin naked or with scattered, slender spines; no lateral line. LETHOTREMUS, 780.
  aa. Barbels present about the mouth; disk below the abdomen; tubercles on sides minute. CYCLOPTEROIDES, 781.
LIPAROPSINÆ: *
II. Spinous dorsal wholly wanting.
    e. Dorsal short, opposite anal, of 9 or 10 rays; skin wholly smooth, without bony tubercles. CYCLOPTERICHTHYS, 782.
    ee. Dorsal long, beginning near middle of back; skin with bony tubercles. LIPAROPS, 783.

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suborbital is thin and broadens as it extends back to the preopercle. The interopercle is more blade-like than in the *Liparididæ.* On 1 genus the pores around the mouth are tubular and form barbels. In this important paper are valuable notes on the osteology and embryology of the *Cyclopteridæ* and *Liparididæ.*

* The *Liparopsinæ*, regarded as a separate family (*Liparopsidæ*) is thus defined by Mr. Garman:

"The deterioration of the first or spinous dorsal seen in the Lumpfish, has apparently proceeded so far in the *Liparopsidæ* as to cause the disappearance of that fin. Each of the 2 genera in the family has but a single dorsal, the posterior. In one genus the fin is short and situated near the caudal, in the other the fin begins near the middle of the back and extends nearly to the origin of the caudal. The genera are further distinguished by dorsal tubercles in one case, and by a naked skin in the other. The shape is somewhat like that of the Diodons, bulky, thick, broad, and longer forward, in the section containing the visceral cavity, and short and greatly reduced in size behind it. The head is short, broad, and thick, the snout short and blunt, the mouth terminal, the teeth subconical, the eyes lateral, the branchiostegal rays 6 in number, the gill openings narrow, the gills 3½, the pseudobranchiæ small, all, with disk, pectorals, and caudal, as in the *Cyclopteridæ.* Until recently this family has been known only from the North Pacific. A short time ago a second species of *Cyclopterichthys* was named by Vaillant from a sketch of a fish taken in the Straits of Magellan, which would extend the distribution to the Antarctic regions." (*Liparopsidæ*, Garman, Discoboli, 40, 1892.)

778. CYCLOPTERUS (Artedi) Linnæus.

(LUMPFISHES.)

Lumpus, GESNER, Hist. Anim., IV, 1284, 1588 (nonbinomial).
Cyclopterus, ARTEDI, Genera Pisc., 62, 1738 (nonbinomial).
Cyclopterus, LINNÆUS, Syst. Nat., Ed. XI, 260, 1788 (*lumpus*).
Lumpus, MCMURTRIE, in Cuvier, Anim. Kingd., 1831 (*vulgaris*).

Body more or less compressed toward the back, somewhat triangular in a transverse section at the first dorsal, covered with conical, rough, bony tubercles; head short, thick, subquadrangular in a cross section; snout blunt, rounded; mouth anterior, opening slightly upward; teeth simple, small, arranged in a band; eye moderate, lateral; dorsals 2; caudal distinct; disk moderately large, anterior below the head; no barbels about the mouth; first dorsal fin in the adult completely hidden by the skin, the larger tubercles of the flanks, though in regular series, having a scattered appearance. One species, reaching a considerable size, in the north Atlantic. (*κύκλος*, circle; *πτερόν*, fin.)

2434. CYCLOPTERUS LUMPUS, Linnæus.

(LUMPFISH; COCK AND HEN PADDLE; LUMP SUCKER.)

Head 5 in entire length; depth 2; D. VI * to VIII, 11; A. 9 or 10; ventral 6; pectoral 20; caudal 12 to 14; branchiostegals 6; vertebræ $11 + 18 = 29$. Body massive, compressed, subtriangular in transverse section through the middle, belly flattened, the portion behind the abdominal chamber much compressed, and less than ½ the length of the body proper. Head short, subquadrangular in transverse section, forehead broad, flattened; nape high; snout short, broad, blunt; mouth wide, anterior, opening with a slight upward direction, extending backward almost to a vertical from the front margin of the eye. Eyes lateral, near the top of the head, as long as the snout, ¼ as long as the head and ⅓ as wide as the interorbital space. Forehead broad, depressed, convex. Nostrils small, the hinder smaller, near the eyes on interorbital space, the anterior farther forward, halfway to the mouth, with a short tube. Gill opening moderately wide, its lower third in front of the base of the pectoral. Fins with rounded margins, rough, with small tubercles. First dorsal distinct on very young individuals, variable in shape, thick and fleshy, with weak rays in older stages; second dorsal distinct, broad, rounded; caudal broad, subtruncate or rounded posteriorly; anal moderate, opposite the second dorsal, which it resembles in shape; pectorals broad, rounded, fringed, not indented at the sides of the disk. Disk little longer than wide, about the width of the head, or nearly ¾ of the length of the latter. Skin thickly sown with small, irregular subconical tubercles, the sides of which are roughened with small, conical protuberances. On older individuals, larger, longitudinally compressed tubercles form a vertical series from the nape over the first dorsal; a series of 3 others stands at each side of the space between the dorsals; a row of larger ones extends from the supraorbital region along the flank to the upper part of the tail; a series, starting a little above the pectoral, passes to the lower portion of the tail; and a third lateral series reaches along each line of the lower surface from the side of the disk to the anal. The fleshy ridge enveloping the first dorsal is subject to considerable variation; it usually continues forward on the nape and becomes indefinite at the occiput. In alcohol the colors are brownish or olive to grayish, the tubercles darker. In life the tints vary from yellowish or greenish in the young to more or less brilliant red in the males, or bluish to dark brown in females; spots, blotches, cloudings, or other markings are not infrequent. The young often take the color of their surroundings.

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* The following formula is given for British specimens: Dorsal IV to VII, 10 or 11; anal 9 or 10; pectoral 20 or 21, ventral 6; caudal 10 or 11.

Mr. Dresel gives the following notes on a small example of this species, 31 mm. long, from Davis Straits:

> The spinous dorsal is comparatively high, and is not enveloped in thick skin as in the adults. The abdominal tubercles are the most developed. The gill opening is as long as the base of the anal fin, which is as long as the disk. D. IV, 10; A. 10. Only 1 specimen, badly mutilated by the Eskimo dogs, was seen at Godhavn. The color was bright olive green, with the belly white. These fish are seldom caught in this harbor after May, during which month they are very abundant.

North Atlantic, on rocky shores of both coasts; south to Cape Cod and France; generally abundant, reaching a length of 20 inches or more, but usually much smaller; they are rarely used as food. According to Garman, the Lumpfish spawns near shore in March or April, after which the female retires to deep water, leaving the male to watch the eggs, which hatch among seaweed and eelgrass. (Eu.) (*lumpus*, from the English lump, the fish having been called *Lumpus anglorum* by Gesner.)

Cyclopterus lumpus, LINNÆUS, Syst. Nat., Ed. XI, 1, 260, 1788, Baltic and North Sea; GÜNTHER, Cat., III, 155, 1861; DRESEL, Proc. U. S. Nat. Mus. 1884, 250; JORDAN & GILBERT, Synopsis, 747, 1883; GARMAN, Discoboli, 21, 1892, and of authors generally.
Cyclopterus minutus, PALLAS, Spicilegia, Zool., VII, 12, 1769, Atlantic Ocean.
Cyclopterus pavoninus, SHAW, Nat. Misc., IX, pl. 310, 1797.
Cyclopterus pyramidatus, SHAW, Gen'l Zool., V, 390, 1804.
Gobius minutus, MÜLLER, Zool. Dan., IV, 38, 1808, Denmark.
Cyclopterus cœruleus, MITCHILL, Trans. Lit. and Phil. Soc. N. Y., I, 1815, 480, New York Harbor.
Cyclopterus coronatus, COUCH, Nat. Hist. Cornwall, 47, 1823, Cornwall.
Lumpus vulgaris, MCMURTRIE, in CUVIER, Anim. Kingdom, 1831; after LINNÆUS.
Lumpus anglorum, DE KAY, N. Y. Fauna: Fishes, IV, 305, 1842; after LINNÆUS.

779. EUMICROTREMUS, Gill.

Eumicrotremus, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 190 (*spinosus*).

Body and head covered with spines and tubercles, not arranged in regular rows; first dorsal not hidden so early in life as in *Cyclopterus*. Eyes and disk larger than in *Cyclopterus*, the gill openings rather smaller. Dorsal rays VI or VII, 10 or 11. Size small. Northern seas. (*εὖ*, very; *μικρός*, small; *τρῆμα*, aperture.)

a. Body rather elongate, the depth $2\frac{1}{4}$ in length; tubercles large. SPINOSUS, 2435.
aa. Body short and deep, the depth $\frac{1}{2}$ length; tubercles smaller. ORBIS, 2436.

2435. EUMICROTREMUS SPINOSUS (Müller).

Head 2¾; depth 1¾. D. VI, 11; A. 10; P. 21; branchiostegals 6. Body exceedingly robust, abruptly compressed posteriorly; the length of the head less than its height; crown convex, orbit large, less than ⅓ of the length of the head. Mouth moderate, reaching a vertical from the foward margin of the orbit. Teeth small, simple, subconical, in a narrow band. On younger examples the anterior dorsal is quite distinct, and does not form a continuous arch with the outline of the back in front of it, as in the Lump, but aged specimens approach the latter more nearly in these respects. Between the 2 dorsals the space is less than base of first. Caudal subtruncate on its posterior margin, the angles rounded off; all the fins with rounded margins. Each of the conical tubercles with which the skin is covered is rough, with small projections on its sides and base; some of the tubercles in diameter of base measuring nearly or quite as much as width of orbit; the largest appearing in a group of 8 or 9 on the middle of the flank, and in several series from the crown to the base of the second dorsal; one of the large ones standing at each side of the space between the dorsals; a couple of moderate-sized ones seen in front of the shoulder, those on the entire caudal region smaller, as also those below the head and body. A young example, about 1¼ inches in length, has a similar outline in transverse section as wide as high, is abruptly compressed behind the abdomen, and shows the first dorsal as free and distinct as the second; back somewhat arched under the base of the anterior; interorbital space slightly concave, ¼ wider than the orbit, and ¼ narrower than the disk; disk nearly ⅓ wider than the orbit. Entire body covered with irregular-sized spiny tubercles; on the sides of each tubercle the small spines slender and bristle-like, and their development comparatively greater than that obtaining among them on older examples. Later in life it is the central portion or cone of the tubercle that develops, while the lateral outgrowths remain small. On the young individuals the larger scales occupy the spaces behind the pectorals, above the opercles, and at the sides of the first dorsals. Dr. Günther, 1880, figures some young specimens an inch in length, some with tubercles, others without them, and shows the fins to be angular early in life. The color is olivaceous to brownish, very likely reddish in life, clouded with darker. From the material before us, this species appears to be less compressed than either *Cyclopterus lumpus* or *Eumicrotremus orbis*. In a transverse section, in front of the first dorsal, it is nearly round, whereas in either of the others such a section is considerably higher than wide. Compared with them in regard to length, it may be described as elongate. How much of this difference in form is to be credited to individual variation we can not at present determine. Bearing in mind the variations seen in a lot of specimens of *C. lumpus*, it does not seem at all impossible that *E. spinosus* and *E. orbis* may have to be united, as has been suggested by several authors, but unless other specimens show closer approaches than these, they are certainly better kept separate. (Garman.)

Mr. Dresel gives the following notes on a specimen, 90 mm. long, from the stomach of a halibut in Davis Straits:

D. VII, 11; A. ca. 10. The head and body suborbicular; the body posteriorly is abruptly compressed. The mouth is moderate, the jaws with narrow bands of villiform teeth. The maxilla reaches to below the anterior margin of the eye, its length being contained 2⅓ times in that of the head. The gill opening is small, as long as the diameter of the eye, which is contained 3 times in the length of the head. The disk is about as long as it is broad, ⅔ of the length of the head. The interorbital width is greater than ½ the length of the head, and not quite twice the diameter of the eye. Length of head contained 3 times, greatest height of body 2 times, in total length. The body is covered with conical plates of various sizes, those of the pectoral region being the largest, about as large as the eye. The plates are studded with small tubercles, and the larger ones have the centers elevated and pointed. Color in spirits, light brown, with traces of punctulations on the skin between the plates.

North Atlantic and Arctic oceans, south to Maine and Denmark; the specimens above described (by Mr. Garman) from Eastport, Maine. (Eu.) (*spinosus*, spinous.)

Cyclopterus spinosus, MÜLLER, Prodr. Zool. Dan., IX, 1777, Denmark; FABRICIUS, Fauna Grœnlandica, 134, 1780; GÜNTHER, Cat., III, 157, 1861; JORDAN & GILBERT, Synopsis, 746, 1883.

Eumicrotremus spinosus, GILL, Proc. Ac. Nat. Sci. Phila. 1873, 190; DRESEL, Proc. U. S. Nat. Mus. 1884. 249; GARMAN, Discoboli, 34, 1892.

Lumpus spinosus, STORER, Synopsis, 482. 1846.

2436. EUMICROTREMUS ORBIS (Günther).

Head 2½; depth 1½. D. VII, 9; A. 10; caudal 10; branchiostegals 6. Body compressed, thick, short, and high; head short, higher than wide, flattened; supraorbital angles prominent. In the specimen described, badly shrunken by drying, the height of the head is contained in the distance from the snout to the base of the caudal nearly twice. Eye large, about 3½ times in the length of the head. Teeth numerous, small, subconical, in pavement, 4 or 5 series. Anterior dorsal much as in a specimen of *C. lumpus* of 3 inches in length, the sides of the fin covered with spines of moderate size, the spinous rays 7 in number. The upper outline of this fin is much like that of the Lump, in being arched backward, or crescentic. The 10 rays of the second dorsal are very distinct; the membranes are not so tuberculate as those of the first. Entire body and head covered with spiny conical tubercles, the largest in a group of 7 or 8 on the flank behind the pectorals, another on the forehead, and those on the supraocular ridge. A single large one stands at each side of the space between the dorsals. Those on the flanks are in contact, and on an example 4½ inches in length there are several that exceed ½ inch in diameter. The sides of the tubercles are roughened by multitudes of fine sharp spines. Under chin and throat the tubercles are smaller, close together, and very numerous. The origin of the first dorsal is above and a little in front of the gill opening. The latter is above the base of the pectoral, behind the eye; its width is hardly as great as that of the orbit. Professor Collett gives a good figure of *C. spinosus;* to compare the specimen from which these notes are taken with it, the Pacific representative is higher and more arched in front of and over the first dorsal, the depth of the body is greater in proportion to the length, and the spines above the lateral line, from the space between the dorsals to the back of the skull, are a great deal smaller. These differences are such as may obtain on individuals, it is true, but until direct comparisons of series from the Pacific are made with others from the Atlantic it is hardly worth the while to throw *C. orbis* in with *C. spinosus*. The 2 species are very closely allied, but with our specimens it does not seem best to bring them together as one. (Garman.) Northern Pacific, south to Vancouver Island; not rare. The specimen above described from St. George Island, Bering Sea.

The following notes are taken from a very large specimen, 5 inches long, from the Aleutian Islands. (Coll. Alaska Comml. Co.):

Head 3; depth nearly 2; D. VII, 11; A. 10; caudal 10. Body orbicular, cuboid anteriorly; base of spinous dorsal and body behind vent abruptly compressed; teeth in narrow bands; gill openings on a level with eye, slightly narrower than orbit. Spinous dorsal not hidden, covered with rough tubercles, similar to those on body, but smaller; width of ventral disk slightly less than its length, and somewhat less than length of head. Body covered with irregular roundish conical plates, varying much in size, some of the larger with a central point, turned backward; all the plates with small tubercles and slender flexible prickles; small plates along bases of all the fins; a series of 6 large plates extending backward from above eye to opposite the interval between dorsals; a series of 5 on each side of middle of interocular space from snout to nape, these increasing much in size posteriorly; a series of 3 along opercular margin; along base of spinous dorsal, a series of 4, not connected with that of interorbital space; a single large plate on each side of the interval between dorsals; 2 longitudinal series of 4 large plates each, beginning above base of pectorals and behind gill slits, terminating under the space between dorsals; the largest plate on body is immediately behind axil of pectoral; a smaller one below it, and 2 others between it and origin of anal; 2 series of smaller plates below eye; many small plates interposed between the series of large ones; very small plates on under side of head and middle of tail; no plates between ventral disk and vent; none in axil of pectorals. Color olivaceous, the skin between the plates thickly punctate.

"Three young examples, the largest 27 mm. long, were dredged south of Sannak Islands and in Bristol Bay (depth 19 to 70 fathoms). Fin rays in these vary as follows: D. VI or VII, 9 or 10; A. 8 to 10. We agree with Garman in considering it advisable to distinguish the north Pacific form from *E. spinosus*, until adequate series can be compared." (Gilbert.) (*orbis*, orb or sphere.)

Cyclopterus orbis, GÜNTHER, Cat., III, 158, 1861, Vancouver Island.
Eumicrotemus orbis, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 454; GARMAN, Discoboli, 36, 1892.
Cyclopterus spinosus, JORDAN & GILBERT, Synopsis, 746, 1883; not of MÜLLER.

780. LETHOTREMUS, Gilbert.

Lethotremus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 449 (*muticus*).

This genus differs from *Eumicrotremus* in the total absence of the bony plates, and of lateral line or pores on sides of head and body. The skin is either smooth or armed with scattered prickles. (λήθη, forgetfulness; τρῆμα, apertures.)

a. Dorsal rays VII, 11; anal 10; skin perfectly smooth. MUTICUS, 2437.
aa. Dorsal rays V, 7; anal 6; skin prickly. VINOLENTUS, 2438.

2437. LETHOTREMUS MUTICUS, Gilbert.

D. VII, 11; A. 10; P. 23. Depth 2 to 2½ in length; head 2⅓ to 2½. Eye very large, 2⅓ to 2½ in head, equaling interorbital width. In *Eumicrotremus orbis* of equal size, the length of the slit slightly less than its distance from upper base of pectorals. Diameter of ventral disk ⅚ length of head, equal to width of mouth. No barbels or filaments. Origin of spinous dorsal slightly in advance of gill slit, distance between dorsals equaling half diameter of eye; origin of anal under that of second dorsal; no notch between upper and lower portions of pectoral fin, the lower rays thickened but not lengthened, the length of upper ray equaling that of snout and eye. Vent separated from disk by slightly more than ½ its distance from front of anal. Color in spirits, brownish above, white below, the upper parts finely freckled with small black specks. Length about 1¼ inches. Aleutian Islands. This species closely resembles in form, fin rays, and general appearance *Eumicrotremus orbis*, but differs, in addition to the generic characters already stated, in the much larger eye, the lower spinous dorsal, and the extreme reduction of the posterior nasal tube. In young examples of *E. orbis*, the posterior nasal tube is much longer than the anterior, and equals ½ the diameter of eye. In *L. muticus*, both tubes are short, and the posterior is little more than an elevated rim to the nasal opening. The naked specimens from the Atlantic, reported on by Dr. Günther under the name *Cycloptremus spinosus*, are probably referable to *Lethotremus*. (Gilbert.) (*muticus*, unarmed.)

Lethotremus muticus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 449, pl. 31, Unimak Pass, Alaska, at Albatross Stations 3223 and 3258, in 56 and 70 fathoms.

2438. LETHOTREMUS VINOLENTUS, Jordan & Starks.

Head 2¼ in length; depth 2¼. D. V, 7; A. 6; eye 3 in head; snout nearly 4; maxillary 2½; interorbital 2⅓; ventral disk 1⅓; height of spinous dorsal 2⅓; length of pectoral 2¾. Body short and thick, broadest at head, deepest in front of first dorsal spine, abruptly compressed at vent; back somewhat elevated. Mouth terminal, oblique, the jaws about equal; snout very blunt; maxillary reaching slightly past the vertical from front of eye; teeth in narrow villiform bands; teeth on vomer (the specimen is so small, we can not be sure of the palatine teeth); eye large, set high in the head, its diameter greater than the length of the snout; interorbital wide and flat, the diameter contained 1½ times in the width; gill opening oblique, about as wide as eye and on a level with eye; disk ¼ longer than broad, its length about equal to distance from gill opening to anterior edge of eye. Skin thick; head and body nearly naked, a few spines scattered over it; spinous dorsal with 3 or 4 small spines, a minute simple spine in front of eye and 2 or 3 above it; 4 multifid spines following the curve of back, under spinous dorsal, and 1 under the front of second dorsal, 2 similar spines on each side of nape, just above opercles; 2 on edge of opercle and 3 on edge of preopercle; an irregular row of 6 running from above base of pectoral to front of anal fin, and a couple of small ones behind gill opening; body otherwise naked. All the spines, with the exception of those noted as simple, are long sharp spines in groups of from 3 to 6 with a common base, generally the length of each spine exceeding length of the base. No lateral line. Spinous dorsal reaching to the first ray of soft dorsal when fin is depressed, higher than soft dorsal; anal and soft dorsal similar; caudal small, truncate or slightly rounded; pectorals very short, reaching to the posterior edge of ventral disk. Color bright wine red, slightly lighter below, without markings, sides dusted over with very small dark points; spinous dorsal dusky; other fins colorless. Colors disappear in alcohol. One specimen ½ inch long, dredged in Puget Sound. If the adult shows the same characters, it must become the type of a distinct genus. (*vinolentus*, wine-colored.)

Lethotremus vinolentus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 827, pl. 94, Puget Sound, near Seattle, Washington. (Type, No. 3131, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

781. CYCLOPTEROIDES, Garman.

Cyclopteroides, GARMAN, Mon. Discoboli, 37, 1892 (*gyrinops*).

Body short, thick, slightly depressed anteriorly, compressed posteriorly. Head broad, short; snout short, obtuse; subordital produced to connect with the preoperculum, widening backward. The bases of both dorsals are thickly enveloped in skin and flesh. Ventrals united, forming a large adhesive disk. Chin with tubular pores, or barbels. Teeth small, subconical. Gill openings narrow; gill membranes united and attached to the isthmus. Gills 3½. Pseudobranchiæ present. Six branchiostegal rays. Intestine long. Like *Cyclopterus*, to which it is closely allied, the species of this genus appears to derive a portion of their food from vegetation. (*Cyclopterus; εἶδος*, resemblance.)

2439. CYCLOPTEROIDES GYRINOPS, Garman.

Head 3 in total length; D. 8 or 9; A. 9; pectoral 24; caudal 10; cæca 10 or 11; branchiostegal 6. Body oblong, compressed toward the dorsals, broad toward the belly, subtriangular in transverse section, abruptly compressed in the posterior portion between the second dorsal and the anal, deep near the abdomen, and tapering rapidly to the caudal fin. Belly flattened, ⅔ as wide as long. Head short, as long as high, wider than long; interorbital space concave transversely and slightly so longitudinally, steeply inclined on snout and sides; cheeks swollen; mouth anterior, somewhat oblique, little wider than interorbital space, not reaching a vertical from front of eye; lower lip interrupted for a short distance at the symphysis; chin with a series of 4 barbels on each side formed by tubular prolongations of the pores similar to those of the nostrils. Teeth very small, conical, slightly hooking backward, in 5 rows at the symphysis, some of which are shorter and do not extend so far toward the sides as the others. Nostrils small, tubular, the posterior between the eyes, and the anterior halfway between the posterior and the mouth. Eye moderate, lateral, as long as the snout, more than 4 in head, prominent above the outline of the forehead. Gill opening very small, covered by the spine-like angle of the opercle, at a distance above the base of the pectoral equal to about twice its own width. Skin covered with mucus, with 4 series of very small, distant, 1- to 8-spined tubercles on each side; 1 series on each side of the median line of the forehead along the sides of the bases of the dorsals, another from each orbital ridge backward on the flank parallel with the first, another behind each eye, and the fourth at the lower edge of the gill opening; below the last series the skin is quite bare. Ventral disk as long as the head, as broad as long, or broader, nearly twice as far from the caudal as from the mouth. Dorsal fins very thick at their bases, enveloped in loose skin through which the rays may be distinguished, separated by an interspace, the first higher, originating above the gill opening; base of the second higher in front, and the posterior rays more free from the thick skin. (The extremities of the rays are all weak, and in most cases have been carried away. That the caudal fin was pointed is indicated by the strength of the median rays; in other words, the fin was longer in the middle.) Pectorals broad, rounded in the upper part posteriorly, reaching as far backward as the hinder edge of the disk; lower border but little indented, if at all, with ends of rays prolonged as a short fringe. Color brown, approaching a chocolate; belly light; a dark brown blotch between the eyes, another from each eye through anterior nostril to mouth, 1 below eye to throat, 1 or 2 back of eye on opercle, a larger one behind gill opening, several small ones close along bases of dorsals, and an elongate band on the hinder part of flank and on base of caudal portion; peculiar marks exist in a brown blotch, on each side of hinder part of abdomen, on which is a bunch of 3 white spots like a clover leaf, in a white band, reaching toward the flank at each side of hinder margin of disk, and in a white spot at posterior ends of branchiostegal rays. Total length a little less than 2 inches. St. Paul Island, Alaska (Garman); the young taken by us in the harbor of Unalaska. (*γυρινός*, tadpole; *ὤψ*, appearance.)

Cyclopteroides gyrinops, GARMAN, Mon. Discoboli, in Memoirs Mus. Comp. Zool., Cambridge, 37, 1892, St. Paul Island, Alaska.

782. CYCLOPTERICHTHYS, Steindachner.

Cyclopterichthys, STEINDACHNER, Ichth. Beiträge, x, 14, 1881 (*glaber = ventricosus*).

Body short and thick, rounded, covered with thick, smooth skin, destitute of bony tubercles; tail slender, compressed, the body abruptly contracted to its base; head broad, obtuse; mouth oblique, the lower jaw prominent; teeth rather small, simple, hooked, sharp, in 2 rows anteriorly; pseudobranchiæ large; gills 3½; suborbital connected by a bony stay with the preopercle; gill opening small, above the base of the pectoral, which is broad and procurrent; ventral disk moderate, fringed. Dorsal short and high, of soft rays only, opposite the short anal, both well separated from the small caudal. (*Cyclopterus; ἰχθύς*, fish.)

2440. CYCLOPTERICHTHYS VENTRICOSUS (Pallas).

Head 2¾; depth 3½. D. 9; A. 7 (8 or 9 Pallas); P. 20; C. 11. Body stout, thick, short, smooth, abruptly compressed behind the body cavity. Caudal portion nearly ⅖ of the total length. Head about ⅓ of the length without the caudal, broad, depressed but convex on the crown, blunt and broadly rounded on the snout. Mouth wide, anterior, opening slightly upward, its corner before the middle of the eye. Teeth small, simple, in 2 series in front, and but 1 toward the sides. Pallas says of the dentition: "Maxillarum margines ossei, denticulis minutis, curvulis, obtusiusculis, ionordinatis et inæqualibus, passim geminatis asperi; quorum in superiore maxilla interiores majores." Eye lateral, its diameter contained 7 times in the length of the head. Gill slit 4 in head. Dorsal short, behind the abdominal chamber, its upper extremity extending behind a vertical from the base of the caudal, margin rounded; anal smaller than the dorsal and opposed to it, though originating a trifle farther back; caudal subtruncate, rounded. Vent almost directly in the middle of the total length. Disk subcircular, with a broad cutaneous margin, 1½ in head. Brownish, with numerous scattered, small, rounded spots of darker; our specimens plain blackish olive. Bering Sea; Sea of Okhotsk (Steindachner); our specimens from St. Paul Island, Pribilof Group; also found at Petropaulski; occasionally taken in abundance. (*ventricosus*, large-bellied.)

Cyclopterus ventricosus, PALLAS, Spicilegia, Zool., VII, 15, t. 2, 1769, Kamchatka.
Cyclopterichthys glaber, STEINDACHNER, Ichth. Beiträge, X, 14, pl. 8, 1881, Sea of Okhotsk.
Cotylis ventricosus, GÜNTHER, Cat., III, 498, 1861.
Cyclopterichthys ventricosus, JORDAN & GILBERT, Synopsis, 745, 1883; GARMAN, Discoboli, 41, 1892.

783. LIPAROPS, Garman.

Liparops, GARMAN, Discoboli, in Mem. Mus. Comp. Zool., 42, 1892 (*stelleri*).

A little-known genus, apparently closely allied to *Cyclopterichthys*, but distinguished by the elongate dorsal, the tubercles, and the dentition. One species known. (*Liparis*; ὤψ, appearance.)

2441. LIPAROPS STELLERI (Pallas).

Body oval, smooth, the chest in the middle, the depth 4 inches; a single series of osseous tubercles along the middle of the back to the origin of the dorsal fin; lower jaw longest; teeth slender, blunt, unequal; eyes small, high; gill opening reduced to a round foramen; opercle large. Disk between pectoral fins. Dorsal fin commencing on the middle of the back and extending to near the base of caudal; anal ending opposite dorsal; anal slender. Petropaulski, Kamchatka, where it is rare (Pallas); not seen by any recent collector. (Named for Georg Wilhelm Steller, naturalist and explorer.)

Cyclopterus stelleri, PALLAS, Zoogr. Rosso-Asiat., III, 73, 1811, Kamchatka, Harbor of Peter-and-Paul; described from manuscripts of STELLER.
Cotylis stelleri, GÜNTHER, Cat., III, 499, 1861.
Cyclopterichthys stelleri, JORDAN & GILBERT, Synopsis, 745, 1883.
Liparops stelleri, GARMAN, Discoboli, 42, 1892.

Family CLXXXIII. LIPARIDIDÆ.

(The Sea Snails.)

Body more or less elongate, tadpole-shaped, subcylindrical anteriorly, compressed behind, the head depressed; both head and body covered with smooth, thin skin, which is very lax. Head broad, obtuse, the snout short, wide, and blunt; third suborbital bone styliform behind, forming a bony stay articulating with the preopercle, as in *Cottidæ*; mouth moderate, anterior, terminal, the jaws equal, or the lower included; jaws with bands of small teeth, which are simple or more or less tricuspid, usually close set, forming a pavement; no teeth on vomer or palatines; premaxillaries protractile, little movable; opercular bones unarmed; interopercle slender, ray-like, overlying the branchiostegals; gill openings small, the membranes joined to the broad isthmus and to the humeral arch below. Branchiostegals 6. Gills 3½, no slit behind the last; pseudobranchiæ small or wanting; dorsal fin rather long, the spines feeble and flexible, low, similar to the soft rays; anal long, similar to the soft dorsal; ventral fins I, 5, the two completely united and forming the bony center of an oval sucking disk, or else sometimes entirely wanting; pectoral fin very broad, the base procurrent, extending forward under the throat, the outline usually emarginate, some of the lower rays being produced; tail diphycercal; caudal fin short, convex; vertebræ numerous, 35 to 50; pyloric cæca numerous; no air bladder; stomach siphonal, U-shaped, intestine elongate. Genera 9; species about 40. Small, sluggish fishes, nearly all of the Arctic seas, a few belonging to the Antarctic; found adhering to rocks at various depths. The group is evidently closely allied to the *Cottidæ*, and its origin must be sought in the ancestors of such types as *Psychrolutes* and *Cottunculus*, the *Cyclopteridæ* representing a coordinate phase of degradation.

The following additional characters are given by Mr. Garman:

> Skeleton with a somewhat larger proportion of osseous matter than that of the *Cyclopteridæ*. As in that family, the skull is full on the back, as if truncate, and has no passage for muscles extending forward between the mastoid and the occipitals. Third suborbital very long, slender, and spine-like, posteriorly reaching toward the posterior margin of the preoperculum. Upper limb of preoperculum expanded. Operculum much reduced, its shape with some resemblance to that of a boot, the sole directed downward and the toe backward. Suboperculum slender, like an inverted V with the limbs curved outward, the anterior extending forward along the preoperculum, and the posterior reaching back under the lower border of the operculum. Interoperculum long, styliform, reaching from suboperculum to articular, frequently mistaken for one of the branchiostegal rays. Reasons for separating this family from the *Cyclopteridæ* and placing it farther from the *Cottidæ* exist in the continuous dorsal, the connection of dorsal and anal with the caudal, the more complete transformation of the ventral rays, the more slender and spine-like suborbital process, the expanded upper limb of the preoperculum, the styliform interoperculum, the shorter olfactory nerves, and the more elongate brain. (Garman.)

Discoboli liparidina, Günther, Cat., III, 158 to 165, 1861.

LIPARIDINÆ:

- *a.* Ventral disk present, large or small.
  - *b.* Ventral disk normal, composed of 13 lobes, a median one in front, and one corresponding to each of the fin rays, each lobe with a deciduous horny covering or papilla. Teeth close set in pavement-like bands, tricuspid in the

young, some or all becoming angular or bluntly arrow-shaped in the adult; caudal fin well developed, rather broad.

c. Dorsal fin divided by a deep notch, which separates the slender spines from the soft rays. NEOLIPARIS, 784.

cc. Dorsal fin continuous, the spines not separated from the soft rays. LIPARIS, 785.

bb. Ventral disk more or less reduced in size or degraded in structure, becoming anterior in position; teeth simple or tricuspid only in the very young; vertebræ numerous.

d. Caudal well developed; teeth slender, curved, in cardiform bands, the inner longer, depressible; ventral disk large; skeleton very soft. BATHYPHASMA, 786.

dd. Caudal fin slender, not distinct from other vertical fins; teeth simple in the adult; vertebræ numerous; dorsal rays 35 to 50; anal 33 to 46. Anterior nostrils usually without tubes; ventral disk very small, nearly under the eye; the vent close behind it.

e. Pectoral fins with the lower lobe well developed; gill openings moderate or small, not greatly reduced. CAREPROCTUS, 787.

ee. Pectoral fins not notched, the lower lobe obsolete, the rays progressively shortened; gill openings reduced to a small pore. GYRINICHTHYS, 788.

AMITRINÆ:

aa. Ventral disk entirely wanting; no ventral fins; teeth mostly simple in the adult; vertebræ and fin rays in large number.

f. Pseudobranchiæ present; lower lobe of pectoral produced. AMITRA, 789.

ff. Pseudobranchiæ wanting.

g. Tip of snout without barbel. PARALIPARIS, 790.

gg. Tip of snout with a pair of barbels; snout projecting. RHINOLIPARIS, 791.

784. NEOLIPARIS, Steindachner.

Neoliparis, STEINDACHNER, Ichth. Beitr., III, 54, 1875 (*mucosus*).

This genus differs from *Liparis* in having a deep notch in the dorsal fin anteriorly, separating the spines from the soft rays. The species approach more nearly to the Cottoid type, from which the Liparids are descended. In general the vertebræ are fewer, the fin rays fewer, the ventral disk larger, and the vertical fins better separated than in the more degenerate members of the family. The retention of the notch between the dorsals fully justifies the recognition of *Neoliparis* as a distinct genus. (*νέος*, new; *Liparis*.)

a. Gill opening very narrow, almost entirely above base of pectoral, the lower edge not below third pectoral ray.

b. Anterior nostrils with distinct tubes.

c. Dorsal spines in the male greatly elevated, not connected by membranes except at extreme base.

d. Dorsal rays about 25; anal 23; head small; ventral disk small. ATLANTICUS, 2442.

dd. Dorsal rays 26; anal 23; head larger; ventral disk comparatively large. RUTTERI, 2443.

cc. Dorsal spines not especially elevated; dorsal rays 34 to 36; anal rays 25 to 28; lower jaw included; form rather elongate, the head depressed; ventral disk $2\frac{1}{6}$ in head. Color pale, irregularly dotted with darker, sometimes plain brownish. CALLYODON, 2444.

bb. Anterior nostrils with a raised rim, and without distinct tubes; head short, blunt, 4 in length; ventral disk very large, 1½ in head; snout blunt; mouth very short, its cleft almost entirely anterior, the maxillary scarcely reaching eye; dorsal rays 32; anal 26. Color plain rosy or brownish, not spotted. MUCOSUS, 2445.

aa. Gill opening rather large, its base opposite 4 or 5 upper rays of pectoral; body deep posteriorly; nostrils with raised rim, but without distinct tubes; ventral disk moderate, 2¼ to 2½ in head; head about 3¾ in body, depressed above; cleft of mouth broader, partly lateral, nearly 3 in head. Color plain brownish or reddish.

e. Dorsal VI, 27; anal 21 to 23; pectoral 30; flesh firm. FLORÆ, 2446.
ee. Dorsal VI, 34; anal 30; pectoral 35; flesh lax. GREENI, 2447.
eee. Dorsal VI, 28; anal 26; pectoral 36. FISSURATUS, 2448.

2442. **NEOLIPARIS ATLANTICUS**, Jordan & Evermann, new species.

Head 4⅔; depth 4 to 4½. D. VI, 25; A. 23; P. 30. Eye 5 in head; snout 3; ventral disk 1¾ to 2. Body widest at gill opening, compressed posteriorly; deepest below third dorsal spine; head broader than deep, depressed above the eyes; mouth narrow, its cleft transverse and extending to anterior nostril; lower jaw included; teeth tricuspid, the middle cusps highest; gill openings very narrow, the lower border opposite first ray of pectoral; anterior nostril tubular, the tube ⅗ of eye; posterior nostril with a low flap; skin loose, lying in folds. Origin of dorsal not far behind pectoral, its distance from tip of snout ⅓ its distance to base of caudal. Dorsal with a very shallow notch, the spines nearly continuous with the soft rays; in the males much elevated, the tips thickened and membranes deeply incised; the first or longest spine as long as head; the sixth or last not quite ½ head; middle rays of soft dorsal 2 in head; dorsal and anal joined to base of caudal; caudal nearly as long as head; pectoral almost reaching anal, slightly longer than head; lower rays exserted, forming a slight lobe. Color reddish brown, with small scattered light or bluish dots over the body; fins darker, clouded with pale, the dorsal broadly edged with darker. The specimen here described, 37215 U. S. Nat. Mus., is about 5 inches long, from Godbout, Quebec. Numerous other specimens from Salem (20367) and Woods Hole, Massachusetts (40118), agree with this, the females having the first dorsal much lower. It is generally common along rocky shores from Newfoundland to Cape Cod. This species has been repeatedly recorded under the name *Liparis montagui*, Donovan, but it is not identical with the European species of that name. The published figures of *N. montagui* show a deeper fish with larger head, and with the spinous dorsal very low, and scarcely distinct from the soft rays. Day's figure looks remarkably unlike our fish. Unfortunately the European specimens of *Neoliparis montagui* in the National Museum are all too small for satisfactory comparison.*

Neoliparis atlanticus, JORDAN & EVERMANN, new species, Godbout, Quebec. (Type, No. 37215.)

Liparis montagui, CUVIER, Règne Anim. Ed. I, vol. 2, 227, 1817; JORDAN & GILBERT, Synopsis, 743, 1883, in part; GARMAN, Discoboli, 47, 1892, with plate, and of authors generally.

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*Dr. Boulenger has kindly sent us the following note on *Liparis montagui:* I have examined about a dozen of our British *Liparis montagui*. of all sizes up to 5 inches. The anterior dorsal looks very indistinct, has no detached portion, and none of its rays are ever produced into filaments.

Cyclopterus montacuti, Turton, British Fauna, 115, 1807; after Donovan.
Liparis gobius, Cuvier, Règne Anim., I, 227, 1817; after *Gobius*, Müller, Zool. Dan., IV, 16, 1806.
Cyclopterus liparoides, Nilsson, Prodr. Ichth. Scand., 62.
Lepadogaster cornubiensis, Thompson, Proc. Zool. Soc. Lond. 1835, 81, Cornwall.
Liparis reticulata, Couch, Brit. Fish., II, 195, 1863.
Liparis ekströmi, Lütken, Vid. Medd. Nat. For. Kjöbenh. 1865, 221.
Liparis maculatus, Malm, Förh. Skand. Naturf. 1865, 412.
Liparis montagui, with varieties *principalis*, *maculatus*, *annulatus*, *striatus*, *pictus*, *obscurus*, *liparoides* and *ekströmi*, Malm, Bohusläns Fauna, 103, 1877.

Prof. Robert Collett (Christiania Vidensk. Selsk. Förh., 1879, 38) has assigned names to the many color variations of *Neoliparis montagui* as shown in Norway, as follows:

Var. a. *principalis*, Collett, uniform colored; light red yellow with microscopic brownish dots. The common form from Christiania, Stavanger, Flor., near Bergen, Komagsbjord in Finmarken. *Liparis montagui*, Malm, Götheborg og Bohusläns Fauna, 451, 1877.
Var. b. *maculatus*, Malm, dark grayish yellow, the whole body strewn with many rows of small brown spots, smaller than the eye and sharply defined. Bukn and Bohuslän. *Liparis maculatus*, Malm, Förh. Skand. Naturf., 9, 1863, 412.
Var. c. *annulatus*, Collett, reddish gray yellow, with large, irregular red-brown rings of the same length and breadth; on sides of head the rings becoming stripes; Christiansand.
Var. d. *striatus*, Collett, color of *c*, the rings drawn out into lines; the rings only seen in front of first dorsal; about 6 longitudinal red-brown stripes from gill opening to caudal. Bergen. *Liparis lineatus*, Malm, Förh. Sk. Förh., 9, 1863, 412.
Var. e. *pictus*, Collett, as in *striatus*, but the lines very numerous, close set, irregularly vermiculate, with much cross netting or partial rings. Bergen. Finmarken.
Var. f. *obscurus*, Collett, gray brown with many dark brown spots and specks on body and fins; irregular cross bands on caudal; back almost uniform gray brown. Hardanger Fjord.
Var. g. *liparoides*, Nilsson, uniform dark gray brown, the color given by innumerable dark points; trace of band at tip of caudal; paler below. Hardanger, Oefjord in Finmarken Tromsø. *Cyclopterus liparoides*, Nilsson, Prodr. Ichth. Scand., 62, 1832.
Var. h. *ekströmi*, Malm, dark brown, sides strewn with grayish yellow small spots which extend on vertical fins. Bohuslän. *Liparis ekströmi*, Malm, Förk. Sk., Naturf., 9, 1863, 412.

These are evidently mere color forms, expressing the range of variation. Similar color forms may be seen in most of the bright-colored species, *pulchellus*, *agassizii*, *aleuticus*. They are not in any proper sense subspecies, having no geographical bases or separate lines of descent.

2443. **NEOLIPARIS RUTTERI**, Gilbert & Snyder, new species.

Head 3⅔; depth 4⅓. D. VI, 26; A. 23; P. 30; eye 5 in head; snout 2⅔; ventral disk 1⅗. Body widest at gill opening, gradually tapering posteriorly, deepest below third dorsal spine; depth of caudal peduncle 4 in head. Head broader than deep, its depth at occiput 6 in body. Mouth narrow, its cleft almost wholly transverse, extending to vertical from anterior nostril; lower jaw included; teeth tricuspid, the middle cusp highest, arranged in 10 oblique series on each half of the upper and the lower jaws. Gill opening very narrow, restricted to the area above base of pectoral. Anterior nostrils tubular; posterior nostrils with a low rim, the anterior part of which is elevated into a triangular flap. Skin loose, lying in folds and wrinkles. Origin of dorsal at ⅓ the distance from tip of snout to caudal; rays of first dorsal (in the types which are apparently all males) separate almost to base, each ray bordered with a thick membrane, the margin thus formed sometimes incised, producing short, rounded lobes; first spine highest, its height contained 4⅔ in body, the succeeding spines gradually growing shorter, the sixth contained 11½ times in body. Height of second dorsal near its middle, 3 in head; dorsal and anal joined by membranes to base of caudal, the anal more broadly joined than the dorsal, attached to basal fifth of lowest caudal ray; caudal rounded posteriorly, its length 4⅘ in body; origin of anal below first ray of second dorsal; height of anal a little less than that of dorsal; pectoral extending to a vertical crossing body halfway between anus and origin of anal fin; length of pectoral 5⅓ in body, its upper part rounded posteriorly; the fifth, sixth, and seventh rays from below elongated, with exserted tips, forming a short lobe. Long diameter of ventral disk 6 in body. Vent slightly nearer to margin of disk than to origin of anal fin. Color bluish slate, lighter along middle of sides; belly and gill membranes whitish; pectorals, anal, and posterior half of dorsal very narrowly edged with white; rays of first dorsal indistinctly barred. In the following table the measurements of 3 specimens are expressed in hundredths of the length of the body:

	No. 1.	No. 2.	No. 3.
Length, in millimeters, to base of caudal fin....	37	44	50
Length of head in body........................	28	26	27
Depth of body..................................	20	20	23
Distance from snout to dorsal	33	31	34
Distance from snout to anal....................	50	47	48
Depth of caudal peduncle.......................	7	7	8
Length of snout................................	10	11	11
Diameter of eye................................	5	5	5
Width of mouth.................................	11	12	12
Width of gill opening..........................	4½	5	5
Height of first dorsal ray.....................	18	23	22
Height of dorsal fin near middle...............	8	7½	8
Height of anal.................................	6	7	7
Length of pectoral	18	20	21
Longitudinal diameter of disk..................	15	16	16
Length of caudal	18	19	20
Number of dorsal rays..........................	VI, 26	VI, 26	VI, 26
Number of anal rays............................	24	24	23
Number of pectoral rays	....	30	30
Number of caudal rays	....	12	13

Neoliparis rutteri is closely related to the Atlantic species, *Neoliparis atlanticus*. It differs from it in the longer head, and the comparatively larger ventral disk. The 2 species differ from all other known species of the genus in having the dorsal spines in the male greatly elevated and not connected by membrane except at extreme base. From *N. floræ* and *N. greeni*, *N. rutteri* differs also in having a much smaller gill opening and fewer dorsal rays; and from *N. mucosus* in having the pectoral more deeply notched and the anterior nostrils with a tube. Kadiak Island, Alaska. Known from numerous specimens, the longest 61 mm. in length. (Gilbert & Snyder.) (Named for Cloudsley Rutter, now of the U. S. Fish Commission who collected in Kadiak in 1896.)

Neoliparis rutteri, GILBERT & SNYDER, MS., Fishes of Kadiak, Ugah Bay, Kadiak Island. (Coll. Cloudsley Rutter. Type, No. 5701, L. S. Jr. Univ. Mus.)

2444. NEOLIPARIS CALLYODON (Pallas).

Head 3⅘; depth 4⅓. D. VII, 33; A. 26; pectoral 31; caudal 14 to 16; eye 6½; snout 2½; pectoral 1⅔; ventral disk 2⅙; caudal 2. Body moderately elongate, compressed posteriorly; depth of head 1⅖ in its length, breadth 1⅓; mouth rather large, the maxillary buried under the skin, reaching slightly past anterior edge of eye; teeth small, tricuspid, in about 8 oblique rows; snout blunt and rounded; interorbital space wide and slightly convex; posterior nostril ending in a short wide tube, the anterior much smaller; behind the posterior nostril, over anterior edge of eye, is a mucous pore; length of gill opening twice the diameter of the eye, its lower third in front of pectoral, extending down to the second or third ray; vent about midway between posterior edge of ventral disk front of anal; pectorals short and broad, with the usual notch below, reaching slightly past vent; ventral disk a little longer than broad, its distance from tip of lower jaw equaling its diameter; origin of dorsal directly over vent, a shallow notch separating its spines from its rays; front of anal much nearer snout than base of caudal, directly under dorsal notch; dorsal and anal scarcely joined to caudal; caudal long and slender, rounded behind. Among our specimens are 2 types of coloration; the first is uniform light olive brown on back, white below; fins all colorless; the other is light brown on back and sides, everywhere spotted with blackish spots irregular in size; lower parts light; pectoral with indistinct dark cross markings; dorsal and anal mottled and spotted with blackish, darker posteriorly; caudal very dark, black posteriorly; lips dusky. Coasts of Alaska and Bering Sea, west to Kamchatka; generally common on rocky shores; recorded from St. Paul, Kamchatka, Plover Bay, Siberia, Unalaska, and Kadiak; our specimens from the 2 islands last named; the description from Unalaska specimens collected by the *Albatross*, the longest 5 inches long. This species is evidently the original *Cyclopterus callyodon* of Pallas, as is shown by the coloration, the small mouth, and the reduced size of the gill openings. It differs from *Neoliparis mucosus* in the much smaller ventral disk, the presence of nasal papillæ, as well as in proportions and coloration. (*κάλλος*, beauty; *ὀδούς*, tooth, from the tricuspid teeth which Pallas had never before seen in a fish.)

Cyclopterus callyodon, PALLAS,* Zoogr. Rosso-Asiat., III, 75, 1811, Kamchatka and Aleutian Islands.

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* The following is the substance of the account given by Pallas: Dorsal 33; anal 24; caudal 15; branchiostegals 6; dorsal and anal fins continued nearly to the base of the caudal. Body oblong, compressed; the head depressed; the snout much depressed, rounded; lower jaw included. Teeth with 3 distinct lobes; a slender bone from the eye to the preoperculum; gill openings reduced to lunate spiracles, on each side; ventral disk small

Liparis callyodon, GÜNTHER, Cat., III, 162, 1861; BEAN, Proc. U. S. Nat. Mus. 1881, 247, 271; JORDAN & GILBERT,* Synopsis, 743, 1883.

2445. NEOLIPARIS MUCOSUS (Ayres).

Head 4 in length; depth 4⅓. D. VI, 26; A. 26; pectoral 29; caudal 12; eye 7 in head; snout 3; ventral disk 1½; pectoral 1⅗; longest dorsal ray 2; highest anal ray 2; caudal 1¼. Body not greatly elongate, rather robust, compressed posteriorly, holding its width well past middle of body; head short and thick, broader than body, ⅓ longer than broad, its length 1⅗ times its depth; mouth small, truncate, its cleft almost entirely anterior, scarcely extending laterally; end of maxillary buried under the skin, barely reaching to eye; nostrils not ending in tubes; lower jaw slightly the shorter; teeth sharp, tricuspid, the middle cusp much the highest and longest, arranged in 9 oblique series in each jaw, becoming more and more oblique toward the sides; interorbital space moderately wide, about 3½ in head, a little convex; gill slit not extending below upper edge of pectoral, its length about 1½ times eye and 3 in ventral disk. Pectoral broadly rounded when spread, its notch comparatively very shallow, its tip reaching past vent but not to notch in dorsal; ventral disk large, slightly longer than broad, its posterior margin almost midway between its anterior and front of anal, its anterior margin ½ its length from chin; dorsal with a shallow notch; origin of fin over posterior margin of ventral disk, its longest rays in its posterior half; origin of anal a little nearer snout than base of caudal, the last 4 or 5 rays rapidly shortened, making the fin truncate behind; dorsal and anal scarcely joined to caudal; caudal long and slender, rounded behind. Color olive brown, light below; indistinctly mottled; dorsal and anal darker at their margins; pectorals uniform dark brown; caudal light, with indistinct cross lines; lips dark. Coast of California. Here described from the only specimen known to us, 5 inches in length, from near San Francisco. It is now in the collection of the California Academy of Sciences (No. 360). Collected by H. D. Dunn, off San Francisco. (*mucosus*, slimy.)

Liparis mucosus,† AYRES, Proc. Cal. Ac. Sci., I, 1855, 24, San Francisco (Coll. W. O. Ayres); GÜNTHER, Cat., III, 559, 1861; STEINDACHNER, Ichth. Beitr., III, 54, 1875; JORDAN & GILBERT, Synopsis, 744, 1883; description copied from STEINDACHNER.

Liparis mucosus, GARMAN, Discoboli, 52, 1892, with plates, figures and description in part; account of the gill openings apparently taken from *Liparis floræ*.

Neoliparis mucosus, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 832, pl. XCV.

2446. NEOLIPARIS FLORÆ, Jordan & Starks.

Head 3⅗ in length of body; depth at ventral disk 5½; depth under middle of soft dorsal 4½. D. VI, 27; A. 21 to 23; caudal 15; pectoral 30;

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between the branchiostegals; dorsal commencing a little behind the gill opening. Yellowish brown above; skin everywhere with brown dots; a silvery streak from the upper jaw through the eye and opercles. Kamchatka; common along the shores and about the (Aleutian) Islands. (Pallas.)

* Described from a small specimen with injured fins lately reexamined by us, in the collection of the Alaska Commercial Company, Unalaska. (Coll. A. Greenebaum.)

† The description of Ayres is not very full and might apply almost equally well to *Liparis floræ*. The account of the head (4 in length) and the eye (nearly 6 in head) point rather to the present species as does also the description of the lax skin. Steindachner's account seems also to refer to the present species, although few of the really distinctive characters are mentioned by him.

eye 7 in head; interorbital space 2¾; maxillary 2½; pectoral 1⅗; ventral disk 2¼. Body moderately elongate, much compressed posteriorly, about as wide as deep anteriorly, its greatest depth under middle of soft dorsal where the back is elevated. Flesh very firm, the body retaining its form, the skin loose but not flaccid. Head small, the nape not produced; mouth moderate, the maxillary extending to below the anterior margin of orbit; jaws subequal; teeth tricuspid, arranged in series which are nearly transverse on middle of jaws, becoming more and more oblique toward the sides, the outermost series nearly parallel with the sides of jaws; nostrils ending in a short, wide tube; gill opening short, extending downward to about the fifth pectoral ray, its length about ½ interorbital space; opercle ending in a flap, which extends over middle of gill opening; ventral disk slightly longer than wide, its distance from tip of lower jaw 1½ times its length; vent equidistant from posterior edge of ventral disk and front of anal; skin thick and not very loose. Origin of spinous dorsal a little in front of the vertical from vent, its distance from snout 3 in length of body; anterior part of dorsal separated by a notch; origin of anal about equidistant from snout and base of caudal fin; some of the lower rays of pectoral produced forming a notch in the lower posterior margin of fin, the fourth to the tenth of the upper rays the longest, forming a rounded point behind, extending slightly past the vertical from snout; dorsal and anal scarcely connected with the caudal; caudal long and slender, rounded behind. Color, a uniform dark olive green, under parts white, a light streak medially along back from dorsal to occiput, a light spot over opercle; pectoral light at base, dusky behind; other fins colored like the body; lips white. The specimen described above, 4 inches long, taken in rock pool on Waadda Island, Neah Bay. A second specimen, about 5 inches long, is in the museum of the California Academy of Sciences. It was collected off San Francisco by Mr. H. D. Dunn. In this specimen, the dorsal rays are VI, 27; anal 25; pectoral 30; caudal 15; teeth blunt. Flesh firm; form and color of the young example above described. San Francisco to Puget Sound. (Named for Mrs. Flora Hartley Greene, then assistant curator of the museum of Leland Stanford Jr. University.)

Liparis cyclopus, JORDAN & GILBERT, Synopsis, 743, 1883; not GÜNTHER.

Neoliparis floræ, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 830, pl. 96, Waadda Island, Neal. Bay. (Type, No. 3133, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

2447. NEOLIPARIS GREENI, Jordan & Starks.

Head 3⅘; depth 4; depth at disk 5. D. VI, 34; A. 30; pectoral 35; caudal 15; eye small, about 10 in head; snout 2¾; longest pectoral ray 1¾; disk 2½; longest dorsal ray 2⅙; longest anal ray 2⅙; caudal 1¾. Body elongate, posteriorly compressed; profile undulate, over snout blunt and rounded, depressed over eyes, well rounded from eyes over occipital region. Skin thin and exceedingly loose nearly to the end of the dorsal and anal rays. Jaws equal; maxillary extending to posterior margin of eye; teeth small, nearly simple, depressible and blunt, slightly hooked back, arranged in oblique series, those in the front running nearly straight in, but toward the sides of the jaw they grow more and more oblique till they are nearly parallel with the jaw at the sides; superior pharyngeal teeth conical and sharp, slightly longer than the teeth in the jaws, arranged in a single round patch on each side; inferior pharyngeals separate, with small teeth. (Teeth probably tricuspid in the young.) Posterior nostrils in a short, wide tube; cheeks well rounded; gill rakers short and thick, no longer on the outer side of the first arch than on the other arches, fourth arch not free; gill slit short, its length contained about 3 times in head, its lower edge extending in front of pectoral to about the third ray; opercles with a blunt spine which is covered by the skin. Dorsals 2, connected by a low membrane; first dorsal about twice as high as anterior part of second dorsal; the first rays of pectorals inserted under eye and in front of disk; the anterior rays short, graduated to the sixth ray, which is about 4 times longer than the first, the next few rays again short and gradually lengthening posteriorly; posterior rays $\frac{1}{3}$ longer than anterior, fin broadly rounded behind; ventral disk nearly round, its posterior edge reaching the vertical from gill slit, its distance from tip of lower jaw $1\frac{1}{3}$ times its length; caudal truncate or slightly rounded; vent under ends of pectorals. Color, in alcohol, uniform brown, breast and lower parts of head creamy, fins slightly darker. When fresh the sides were blotched with pinkish. Esquimault Harbor, near Victoria, Vancouver Island; known only from the type, 10 inches long. (Named for Mr. Ashdown H. Green, of Victoria, president of the Natural History Society of that town.)

Neoliparis greeni, JORDAN & STARKS, Proc. Cal. Ac. Sci., 1895, 829, pl. 96, Victoria, Vancouver Island. (Type, No. 3010, L. S. Jr. Univ. Mus. Coll. Ashdown H. Green.)

2448. NEOLIPARIS FISSURATUS, Starks.

Head $3\frac{1}{4}$ in body; depth $4\frac{1}{2}$. D. VI, 28; A. 26; P. 36; C. 14; eye 7 in head; maxillary $2\frac{1}{6}$; ventral disk $2\frac{1}{2}$. Body moderately elongate, not produced at nape; mouth rather large, the maxillary extending to below middle of eye; jaws subequal; teeth tricuspid, arranged in about 10 oblique series in each jaw; nostrils ending in short, wide tubes; gill openings wider than in any other known *Neoliparis*, commencing a distance above pectoral about equal to the diameter of eye, ending about opposite the fourteenth ray; ventral disk a little longer than wide, its distance from chin equal to $1\frac{1}{2}$ its longest diameter, its posterior edge about the same distance from front of anal; vent nearer anal than ventral disk, its distance from anal equal to $\frac{1}{2}$ ventral disk. Origin of spinous dorsal at the vertical from midway between vent and ventral disk; dorsal scarcely joined to caudal, anal very slightly; front of anal nearer chin than base of caudal by a distance equal to ventral disk; pectoral rather short and wide, reaching to opposite front of anal, the lower lobe very narrow and long, much longer than upper lobe, but not reaching so far posteriorly on account of the oblique position of the fin; tip of lower lobe reaching to vent; length of caudal $1\frac{3}{5}$ in head. Color dusky, darker above, sides with fine punctulations; belly and under parts of head, except chin, white; lips dusky; dorsals and anal darker than body; pectoral dusky at base, the lower lobe dark; caudal crossed with wavy dark lines. This species differs from the other species in this genus in having a wider gill opening, and in various minor characters. Length 2½ inches. Puget sound; only the type known. (Starks.) (*fissuratus*, split.)

Neoliparis fissuratus, STARKS, Proc. Cal. Ac. Sci. 1896, 560. (Type, No. 5044, L. S. Jr. Univ. Mus. Coll. E. C. Starks.)

785. LIPARIS* (Artedi) Scopoli.

(SEA SNAILS.)

Liparis, ARTEDI, Genera, 117, 1738 (nonbinomial).
Cyclogaster, GRONOW, Museum, 1763, 157 (nonbinomial).
Liparis, SCOPOLI, Introd. Hist. Nat., 453, 1777 (*liparis*).
Liparis, CUVIER, Règne Anim. Ed. 1, 1817 (*liparis*; not *Liparis*, Ochsenheimer, 1810, a genus of *Lepidoptera*).
Cyclogaster, GRONOW, Cat. Fishes, Ed. Gray, 40, 1854 (*liparis*; not of Macquart, 1854, a genus of flies).
Actinochir, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 193 (*major*).
Careliparis, GARMAN, Discoboli, 56, 1892 (*agassizii*).
Lyoliparis, JORDAN & EVERMANN, Check-List Fishes, 451, 1896 (*pulchellus*).

Body rather elongate, covered with smooth skin, which is usually freely movable; head short; flattened above; mouth horizontal, the jaws equal or the lower jaw included; teeth in several series, close set, always more or less tricuspid, the adult with the outer cusps often worn or obliterated; maxillary covered by skin of preorbital region; anterior nostrils tubular or not; ventral disk well developed on the breast, its front below or behind the middle of the head, its surface with 13 lobes; an anterior median lobe, and 1 corresponding to each of the 6 rays in each fin; each lobe with a horny papilla covering, which is sometimes lost; vent well behind the head, about midway between the sucking disk and anal fin; dorsal fin continuous, undivided, its spines not differentiated; caudal well developed; dorsal fin free from caudal or joined; pectoral broad, procurrent at base, emarginate and free at tips, some of the lower rays produced; vertical fins enveloped in the lax skin; vertebræ 35 to 55. Northern seas near the shores; the species less arctic in distribution and in general inhabiting shallower water than is the case with *Careproctus* and *Paraliparis*, a fact associated with the reduced number of vertebræ in *Liparis*. The species are numerous, but in general well defined, their characters varying with age. In most of the species color varieties occur, several (*pulchellus*, *liparis*, *aleuticus*, *agassizii*) having the body often marked everywhere with concentric curved stripes or rings. (λιπαρός, sleek-skinned.)

Concerning the species of *Liparis* (including *Neoliparis*), Mr. Garman observes:

> The fishes placed in this genus are mostly small; in general their outlines resemble those of larval anurous batrachians. The anterior portion of the body, containing the abdominal chamber, is usually short, broad, flattened beneath, and somewhat angular

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* *Enantioliparis*, Vaillant, is based on *pallidus*, an Antarctic species with the pectoral very narrow and not emarginate; would seem to be distinct from *Liparis*.

toward the dorsal fin, while the hinder part is elongate, much compressed, and tapering. The more important of the distinguishing features may be summarized as follows: Head short, broad, rounded; snout short, blunt; mouth anterior; lips distinct; teeth small, numerous, in a cardiform band, tricuspid on intermaxillaries and dentary, simple on pharyngeals; eyes lateral, small to medium; nostrils, 2 on each side, with short, projecting tubes; olfactory nerve short; brain elongate; glossohyal rudimentary or absent; gills 3 double and 1 single; gill rakers with denticles; pseudobranchiæ present; gill opening small, above the pectoral; branchiostegal rays 6; branchial membranes not free; tubes and pores of the lateral system forward of the gill aperture; dorsal and anal elongate, more or less closely united with the caudal, with some anterior rays unsegmented; pectorals broad, procurrent under the throat; ventrals transformed into an adhesive disk, situated below the gills between the pectorals; skin thin, loosely attached, smooth, excepting a sexual outgrowth on males in breeding season; stomach siphonal; pyloric cæca numerous; intestine elongate; urinary bladder large, simple; kidneys long, fused a portion of their length; liver large, with partial divisions into lobes; gall bladder small, rounded; skeleton not heavily ossified, less in deep-sea forms; upper limb of preoperculum expanded backward; operculum small; suboperculum narrow; interoperculum elongate, styliform; third suborbital produced backward, in a long, slender process, to the hinder edge of the preoperculum.

The species of *Liparis* inhabit the colder waters of the north and of the south of both Atlantic and Pacific, ranging to great depths. Among those frequenting the shores, if not also the others, vegetation seems to form a portion of the food. The contents of the stomachs are miscellaneous lots of small marine animals (crustacea, worms, mollusks, small fishes, etc.), mixed with which are quantities of seaweeds. Some variation exists in regard to feeding habits among the different species. The teeth of some show no signs of wear from hard food, but in *L. mucosus* they are ground off and blunted, no doubt by contact with the hard-shelled crustacea and hard-scaled agonoid fishes, remains of which are found in the stomachs. Very likely *L. pulchellus* turns his peculiar snout to account by rooting in the mud or sand among the plants, or in turning over the pebbles. Certain species are fitted for a life in beds of seaweed, others are probably more abundant in rocky places.

LIPARIS:

a. Vertebræ in moderate number, about 39; dorsal rays about 35; anal rays 27 to 30.

b. Gill openings very narrow, entirely above base of pectoral; pectoral rays from 34 to 37; head a little shorter than broad, and a little longer than deep; dorsal and anal slightly joined to caudal; caudal narrow, its rays 12. LIPARIS, 2449.

bb. Gill openings broad, the lower part considerably below base of upper ray of pectoral.

c. Pectoral rays 30; head low, flattish, ⅓ longer than broad, ⅓ broader than deep; jaws subequal; dorsal free from caudal, which is slightly joined to anal; caudal narrow, of 12 rays. CYCLOPUS, 2450.

cc. Pectoral rays 41 to 43; head short, not quite as wide as long; caudal 15 to 20; the dorsal and anal slightly joined to its base. FUCENSIS, 2451.

CARELIPARIS (καρά, head; *Liparis*):

aa. Vertebræ about 46; dorsal rays 39 to 44; anal rays 33 to 36; dorsal and anal largely joined to caudal.

d. Pectoral rays 30 to 36.

e. Gill opening small, its lower edge not below first ray of pectoral; nostrils small, the tubes short or absent.

f. Posterior nostril scarcely tubular; fins plain, not distinctly mottled or barred; body robust; its color plain brownish or with dark spots.

g. Dorsal rays 39 or 40; anal 33; pectoral 30 to 34. TUNICATUS, 2452.

gg. Dorsal rays 44; anal 35; pectoral 37. HERSCHELINUS, 2453.

ff. Posterior nostril tubular, fins more or less mottled or barred, body moderately elongate; lower rays of pectoral rather short, not ½ head, not reaching beyond ventral disk; body mottled usually with concentric rings. AGASSIZII, 2454.

ee. Gill opening rather large, extending downward to about fourth ray of pectoral; nostrils with short tubes; lower lobe of pectoral long, reaching much beyond disk, nearly to vent; color brown, the body and fins mottled and clouded. DENNYI, 2455.

dd. Pectoral rays 42; gill opening large, its lower edge below upper part of pectoral; body robust, translucent, covered with round crimson spots. CYCLOSTIGMA, 2456.

aaa. Vertebræ about 52; dorsal rays 45 to 48; anal rays 38 to 40; pectoral rays 34 to 37; dorsal and anal largely joined to caudal; gill opening large, about ⅓ its length before pectoral; anterior nostril tubular.

LYOLIPARIS (λύω, to loosen; *Liparis*):

h. Head broad, flattened above; body rather elongate; skin usually with wavy concentric longitudinal streaks, sometimes spotted. PULCHELLUS, 2457.

ACTINOCHIR (ἀκτίς, ray; χείρ, hand; from the broad pectoral):

hh. Head high, boldly rounded, with prominent nape; color olivaceous, clouded and dotted, but without wavy streaks. MAJOR, 2458.

Subgenus LIPARIS (Artedi) Scopoli.

2449. LIPARIS LIPARIS * (Linnæus).

(SEA SNAIL.)

Head 3½; depth 3½; D. 33 to 35; A. 27 to 29; pectoral 34 to 37; caudal 12 to 14; vert. 38 or 39; cæca 10 to 13; branchiostegals 6. Body moderately stout, somewhat high on the shoulders, compressed behind the body cavity in the caudal portion, which is deep and rather thick anteriorly, tapering rapidly. Body proper about ½ of the entire length to the base of the tail. Length of the head little less than its width, a little more than its depth. Snout short, broad, blunt, nearly 3½ times in the head, very convex in the internasal region. Mouth moderate, maxillary reaching a vertical from the eye, lower jaw shorter. Teeth small, paved, alternating in the different rows, tricuspid. Lower lip interrupted in the middle, ⅓ or more of its length. The fold above the upper lip with 6 to 8 notches below the opening of the pores. A series of 6 pores on each side, from the middle of the fold above the upper lip passes backward and

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* Prof. Robert Collett (Christiania Vidensk. Selsk. Förh., 1879, No. 1, 42), defines the chief color varieties of this species as seen in Norway, as follows:

Var. a. *assimilis*, Collett: uniform light reddish gray, the dots microscopic. Christiania, Bukn, Stavanger, Lofoten; scarce.

Var. b. *stellatus*, Malm: uniform light gray brown, the fins with vertical dark cross bands; dots larger. Christiania, Vadsø, etc. *Liparis stellatus*, Malm, Förh. Skand. Nat., 9, 1863, 412.

Var. c. *subfuscus*, Collett: almost uniform ground color, with dark points; light red cross bands on fins; body faintly marbled. Christiania, Farsund, Varanger.

Var. d. *scorpioides*, Collett: color pale, with large, irregular, dark spots. Varanger.

Var. e. *mixtus*, Collett: spotted and striped; dark spots on fins; along sides and on fins interrupted dark stripes: ring-like lines on head. Lofoten.

Var. f. *decorus*, Collett: striped and spotted; fins spotted; notable stripes on sides. Christiansund and Lofoten.

Var. g. *scriptus*, Collett: striped, the dark stripes larger and more conspicuous, the streaks of ground color fainter. Bukn, Christiania.

Var. h. *lineatus*, Kröyer: striped with 8 to 10 violet longitudinal stripes, alternating with pale streaks of the ground color. *Liparis lineatus*, Kröyer, Nat. Tidskr. 1847, 284.

Var. i. *arcticus*, Collett: uniform brown; grayish golden brown with many dark points, which make the surface dark. Tromsö, Spitzbergen, Magdalene Bay, in Greenland.

Var. k. *fuscus*, Collett: uniform blackish brown, very dark. North Cape, Spitzbergen, Greenland.

As noticed under *Neoliparis montagui*, these variations seem to have no taxonomic value, being products of the immediate surroundings.

curves up behind the eye; another series of 7 on each side passes from the middle of the chin back and upward toward the upper edge of the gill opening. Eye small, nearly as long as the snout, contained 4½ times in the length of the head, or less than twice in the convex interorbital space. Nasal tubules short; posterior smaller between the eyes; anterior farther forward, larger. A large pore is situated a short distance in front of the nostril toward the tip of the snout. Gill openings narrow, not as wide as the eye, above the base of the pectoral. Nape and shoulders high. Cheeks swollen. Skin smooth, thin, easily detached. Dorsal and anal fins rising gradually, the rays attaining their greatest height in the hinder third of the length, united with the caudal by membrane. The separation of the 3 fins is less marked than in *N. montagui*, so much so that it is difficult in some cases to determine whether certain rays belong to the caudal. Dorsal notch shallow or absent, most noticeable in the breeding season. First ray little farther back than the opercular angle, or the hinder edge of the disk; 5 or 6 of the anterior rays crooked and twisted, and without apparent segmentation. Evidently these rays are affected by a nuptial growth, which is not so patent above the skin, on the ends of rays, as in other species. In the anal the first ray is about opposite the seventh or eighth ray of the dorsal; the fin extends farther back than the latter, reaching under nearly ⅓ of the caudal. Caudal slightly rounded posteriorly, the longest rays being ½ to ⅔ of length of the head. Disk subcircular, ½ as long as the head, equal the distance from the chin, less than the distance to the anal. Vent nearly halfway from disk to first anal ray, which latter is halfway between the snout and the base of the caudal. The position varies in the sexes. The body cavity is longer in the females, and the vent is farther back; this applies to all the species. Pectorals broad, deeply notched below the middle of the hind border; rays of the lower portion extending beyond the membrane, a couple of the longer sometimes reaching almost as far back as the vent. A slight fold of the skin unites the fins in front of the disk. Olive to brown, light to dark, puncticulate and clouded, blotched, banded, vermiculate, or longitudinally striped with darker and with lighter. In life the tints vary from lilac to reddish or yellowish, with spaces on certain individuals often nearly white, and every variety of coloration may be taken in a single locality. This being the case, it is thought best to treat the striping, freckling, banding, etc., merely as marks of individual variation, and not as characters indicating established varieties. On the striped specimens the number of lines vary greatly, of the spotted ones no two are alike, and the same is true of every other pattern. Most often there are blotches on the posterior portions of the anal and the dorsal; frequently they take on the appearance of transverse bands, as is still more often the case on the caudal. (Garman.) North Atlantic, on both shores; north to Spitzbergen, south to Connecticut and France; most abundant in Northern Europe. Variable. "The specimens in the museum at Cambridge were secured from the Cheshire coast and other points in Great Britain, from Ostend, and from various localities off the coast of Massachusetts, Connecticut, and Maine. A small specimen, with the locality 'Off Block Island, from a pecten,' that may be positively identified, bears peculiar markings: From the tip of the snout a white line passes above the eye to meet its fellow of the opposite side at the beginning of the dorsal, which is white; and a white spot as large as the orbit extends downward and slightly backward from the eye. These marks are very distinct, and they give the specimen quite a different appearance from that of another of the same size and origin, uniform in coloration." (Garman.) (Eu.)

Liparis nostras, WILLUGHBY, Hist. Pisc., App., 17, 1686, based on a specimen taken September 15, 1685, by Dr. Johnson.

Liparis,* ARTEDI, Descr. Spec. Pisc., 117, 1738, after WILLUGHBY.

Liparis cyclogaster, GRONOW, Mus., 157, 1768.

Cyclopterus liparis, LINNÆUS, Syst. Nat., Ed. XII, I, 414, 1766, Northern Ocean; after ARTEDI and GRONOW.

Cyclopterus lineatus, LEPECHIN, Nov. Comm. Petropol., XVIII, 1774, 522, White Sea.

Liparis liparis, CUVIER, Règne Anim., Ed. I, vol. 2, 227, 1817; GARMAN, Discoboli, 57, 1892.

Gobius smyrnensis, BONNATERRE, Encycl., Icht., 66, 1788; after LEPECHIN.

Cyclopterus musculus, LACÉPÈDE, Hist. Nat. Poiss., IV, 683, 1802, near Havre.

Liparis vulgaris, FLEMING, Brit. Anim., 190, 1828; GÜNTHER, Cat., III, 159; LÜTKEN, Naturh. Foren. Vidensk. Meddels, 1860 and 1861, 243; COLLETT, Norges Fiske, 1875, 65; JORDAN & GILBERT, Synopsis, 742, 1883.

Liparis communis, SABINE, App. Parry's Voy., 1824.

Liparis barbatus, EKSTRÖM, Vet. Ak. Handl., 168, pl. 5, 1832 (D. 32, A. 32, C. 9, perhaps a different species).

Liparis ophidoides, SWAINSON, Nat. Hist. Fishes, II, 339, 1839.

Liparis lineatus multistriatus, LÜTKEN, Naturh. Foren. Vids., 1861, pl. 7 (striped example).

Liparis stellatus, MALM., Förh. Skand., Naturh., 1865.

Liparis lineatus with variations, *assimilis*, *stellatus*, *subfuscus*, *scorpioides mixtus*, *decorus*, *scriptus*, *lineatus*, *arcticus*, and *fuscus* COLLETT; Vid. Selsk., Förh., Christ. 1, 41.

2450. LIPARIS CYCLOPUS, Günther.

Head 4⅙; depth 4½. D. 34; A. 29; pectoral 30; caudal 12. Body much depressed and rather broad anteriorly, deep and much compressed posteriorly; head ⅓ longer than broad and ⅓ broader than deep. Flesh much more firm and the skin less lax than in most species of *Liparis*. Opercles with a rather strong spine concealed by the skin; mouth rather large, terminal; jaws subequal; teeth small, tricuspid, in broad bands; eye small, 6 in head; snout 3, flattish and broad above; interorbital space 4⅔ in head; ventral disk oval, 2⅓ in head, its anterior edge ½ the length of the eye behind postorbital margin; gill opening moderate, 3½ in head, extending downward to the third or fourth ray of pectoral. Dorsal fin low, continuous, not joined to caudal, beginning slightly before anal, on a vertical with vent; vent midway between edge of ventral disk and front of anal. Pectoral fin emarginate, the upper lobe 1⅗ in head, the lower 2, the shortest intervening rays 3. Anal long and low, barely joined to caudal. Caudal 1½ in head. Color olivaceous, darker above; body and pectoral fin finely speckled with olive brown; fins dotted; bases of the fins paler than their tips; belly white. Bering sea to Puget Sound, not common; our description from two specimens 4½ inches long, in excellent condition, taken in Elliot Bay, near Seattle, received from the Young Naturalists' Society. They are numbered 3126 in the register of the Leland Stanford Jr. University Museum. This species, not having been previously recognized since its original description, is recorded by Dr. Gilbert from Unalaska, and 2 specimens from Bristol Bay, Alaska (*Albatross* Station 3230, depth 3¼ fathoms). Garman places *L. cyclopus* in the synonymy of *L. callyodon*, but our specimens are undoubtedly distinct from the species described by Garman under this name (Discoboli, p. 54, pl. 6, figs. 1–5), from a specimen said to originate from San Francisco. Our Alaska specimens are much more slender, with wide depressed head, without nuchal elevation, with the dorsal fin beginning posteriorly slightly in front of the vertical from the vent, and the disk separated from the vent by a distance less than its own diameter. The mouth is also much smaller, not at all oblique, its angle in advance of vertical from front of eye. Not yet recorded from California. (*κύκλος*, rounded; *πούς*, foot.)

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* Garman gives detailed synonymy of this species in Discoboli, 57, 1892.

Liparis cyclopus,* GÜNTHER, Cat., III, 162, 1861, Esquimault Harbor, Vancouver Island; JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 834, pl. 97.

2451. LIPARIS FUCENSIS, Gilbert.

Head 3¼ to 3½; depth 4 to 4⅖. D. V, 30; A. 28 or 29; C. 18 or 20; P. 38 to 39. Body moderately elongate, compressed; head depressed, with gibbous snout and occiput, separated by the depressed interorbital area, which forms a shallow transverse groove. Snout not blunt, the mouth terminal, nearly horizontal, with included mandible, the maxillary reaching to or nearly to the vertical from front of pupil, 3 in head. Teeth all tricuspid. Eye of moderate size, contained 5⅖ in length of head, 1 to 1⅕ times in bony interorbital width, 1⅔ times in snout. Posterior nostril without tube, the anterior with a short tube, less than diameter of pupil. Gill slit comparatively wide, its width equaling length of snout and ½ eye, overlapped by a conspicuous triangular prolongation of the opercle. The slit extends down to opposite the upper third of the pectoral fin. Disk circular, of rather small size, distant from tip of snout 1½ times its own diameter, from vent 1¼ times. Diameter of disk 2¾ times in head. Distance from tip of snout to vent 1⅖ to 1⅔ in distance from tail. Pectorals extending to a vertical midway between vent and front of anal. Lower rays produced, forming a narrow distinct lobe. First 5 dorsal rays spinous, unsegmented, shorter than the succeeding segmented rays, from which they are not separated by notch. Dorsal and anal free from the caudal, the last rays being rapidly shortened, giving a rounded contour to the posterior portions of the 2 fins. Two styles of coloration are observed; 1 plain olive brown, with minute dark points, whitish below; the other, with numerous lengthwise streaks of light olive and dark olive brown, which extends forward on top and sides of head; in both cases the belly is whitish, and the fins dusky, mottled with darker, the mottlings forming indistinct cross bars on the caudal fin. Numerous specimens dredged by the *Albatross* in the Straits of Fuca (August, 1891), serve as the types of this species. It is probably the same as that described by Garman as *Liparis calliodon,* his description being based on specimens "said to have been taken near San Francisco." It is not evident from the text whether the same specimens served as basis for the figures (pl. 6, figs. 1 to 5), concerning which we have no independent data. This locality may be correct. The numerous types of Dr. Gilbert's examined by us are in a collection made by the *Albatross,* about Port Angeles in the Straits of Juan de Fuca. It has not been yet recorded from Alaska. Mr. Garman identifies this species with the *callyodon* of Pallas, but according to Pallas his species had the gill opening reduced to a lunate spiracle which is not the case in *Liparis fucensis.* (*fucensis,* from the Straits of Juan de Fuca.)

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* The following is the original description of *Liparis cyclopus:* Dorsal 32; anal 30; caudal 12. Caudal fin entirely free from dorsal and anal; the latter commences in the vertical from the seventh dorsal ray; pectoral margin with a notch, some of the lower rays being produced; ventral disk ovate, its length being less than ½ of that of the head. A fine specimen. Esquimault Harbor. Presented by Lord John Russell. This species agrees in nearly every respect with *Liparis vulgaris*, from which it differs in the following points besides those mentioned: The greatest depth of the body is nearly ⅕ of the total, the length of the head nearly ⅕. The skin is tougher and more firmly adherent to the body. The head is flat above, the nape of the neck being scarcely prominent. The nostril is a short tube, situated nearly midway between the eye and the upper lip. The pectoral extends only to the vertical from the anal papilla, and the dorsal (anal) fin commences yet more backward. The teeth are small, with 3 lobes. Infraorbital extending to the preoperculum. The color is brownish olive, with darker spots, more conspicuous on the fins than on the body; belly reddish. The length of the specimen described is 45 lines. (Günther.)

Liparis calliodon, GARMAN, *Discoboli,* 54, 1892, locality unknown, thought to be San Francisco; not *Cyclopterus callyodon* of PALLAS.

Liparis fucensis, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 447, Port Angeles, Straits of Juan de Fuca, at Albatross Station 3451, in 106 fathoms. (Type, No. 48600.)

2452. LIPARIS TUNICATUS, Reinhardt.

D. 39; A. 33; P. 30; V. 7; C. 14. Body elongate, subterete; belly prominent. Head thick, obtuse, depressed behind, convex in front. Mouth narrow; the jaws equal; jaws, suborbital region, and gills with small, white points. Eyes small, lateral; nostrils 4, tubulate. Gill opening small, linear. Dorsal fin and anal united to caudal; caudal cuneate. Skin lax, slippery. Color dusky, the flesh reddish, showing through the skin. Length 1½ fingers. (Fabricius.) Coast of Greenland. This description differs from later ones in ascribing more rays to the caudal, and tubes to the nostrils. According to Mr. Garman, the description of *Liparis fabricii,* Kröyer, refers to the same species. The following is its substance: D. 13 + 27 = 40; A. 2 + 30 = 32; P. 34; C. 9; Vert. 46. Head 4 in length, higher than broad, the snout elevated, truncate, lower jaw shorter; anterior nostrils simple, the posterior with raised rim or with very short tube; eye 3 in head; teeth tricuspid; ventral disk elliptical, 9 in length of body; dorsal and anal connate with caudal, which is 6 to 8 in total length. Ashy above, shaded with bluish or orange, spotted with blackish, pale below. Greenland (Kröyer, description of *Liparis fabricii*). *Liparis arctica,* Gill, is apparently the same as *L. fabricii.* The following is the substance of the description: Head 4 in total length; depth 2¾; dorsal 42; anal 34; caudal 11; pectoral 35. Forehead depressed, snout rather high and decurved; the eyes are just within the anterior half of the head; the interorbital is contained 3 times in the head; the anterior nostrils are simple, the posterior tubular; the dorsal and anal are connate with the caudal, the former united for about ¼ of the length of the caudal, the latter ⅖; caudal convex behind and forms ⅐ of the length, the pectoral 5⅛; ventral disk 10. Color uniform, rusty brown or chestnut, without spots or bands. Port Foulke, Greenland (Gill). We have seen no specimens, and follow authority in regarding Fabricius's count of the caudal rays as probably an error. Garman uses the name *tunicatus* instead of *minor*, apparently regarding the original use of the latter name as simply that of the adjective meaning smaller, not as part of the binominal nomenclature. (*tunicatus*, bearing a cloak.)

Cyclopterus liparis minor, FABRICIUS, Fauna Grœnlandica, 135, 1780, Greenland; D. 39; A. 33; P. 30; V. 2; C. 14; not binomial, *minor* being merely an adjective, meaning smaller.

Liparis tunicata, REINHARDT, Overs. Kong. Danske Vidensk. Selsk., VI, CXI, 1836, Greenland; after FABRICIUS; GARMAN, Discoboli, 65, 1892.

Liparis fabricii, KRÖYER, Naturh. Tidsskr., II, 274, 1847, Greenland; D. XIII, 27; A. II, 30; P. 34; C. 9; Vert. 46; GÜNTHER, Cat., III, 161, 1861; GILL, Proc. Ac. Nat. Sci. Phila. 1864, 192.

Liparis arctica, GILL, Proc. Ac. Nat. Sci. 1864, 191, Port Foulke, Greenland; JORDAN & GILBERT, Synopsis, 742, 1883.

2453. LIPARIS AGASSIZII, Putman.

Head 3⅘; depth 4. D. 39; A. 31; pectoral 34; caudal 12; eye 6 in head; interorbital 2½; snout 2½; ventral disk 1⅚; pectoral 1¼; caudal 1⅘. Body elongate, compressed posteriorly, about as wide as deep anteriorly; head as deep as broad, ⅕ longer; mouth moderately large, the maxillary reaching slightly past front of eye; lower jaw included; teeth small, tricuspid, arranged in 8 or 9 oblique rows, which grow more oblique toward the sides; snout broad and blunt, slightly overhanging the mouth; nostrils ending in tubes, the anterior tube wider and longer than posterior; nape high and prominent, scarcely produced; gill opening short, its lower ⅓ or ¼ in front of the pectoral, extending downward to about the second or third ray, its length a little greater than width of eye. Ventral disk slightly longer than broad, its distance from end of lower jaw 1⅔ its length, its posterior margin scarcely midway between its anterior and front of anal; vent nearer posterior margin of disk than front of anal; pectoral broadly rounded behind, the notch made by the produced lower rays shallow, end of fin reaching to the vertical from front of anal; origin of dorsal just over posterior edge of ventral disk, its distance from snout about 3 in body, slightly joined to the caudal posteriorly; origin of anal nearer to snout by a distance equal to length of snout posteriorly joined to the caudal, the tips of the last rays reaching nearly to the middle of caudal rays. Color olive brown, irregularly marked with dark brown spots the size of pupil; belly white; top of head darker than body; dorsal spotted like the body; spots on anal in the form of indistinct bands; pectoral marked with interrupted irregular streaks; a wide dark band across middle of caudal rays, 2 or 3 other narrow streaks across caudal. Here described from a specimen collected by the *Albatross* at Station 3247, in Bristol Bay, Alaska, in 17 fathoms. Its length is nearly 3 inches.

The following is Garman's description of a specimen which was 10 inches in length:

Head 4½ in total length; depth over 4. D. 41 (41 to 44). A. 33 (32 to 35); pectoral 38 (35 to 38); caudal 12; vertebræ 46. Body elongate, rather less inflated anteriorly than the other Liparids, greatly compressed posteriorly. With the exception of the disk the appearance is very much the same as that of the Cottoids. Total length 2¾ times the distance from snout to vent. Head moderately broad, depressed anteriorly, slightly convex in transverse section through the frontal region; snout broad, blunt, rounded, convex, nearly 4 times the diameter of the eye, ⅓ of the length of the head. Mouth wide, maxilla extending behind a vertical from the anterior border of the eye; upper lip complete, lower separated for only about ½ the distance from the angle of the mouth to the middle. Teeth small, tricuspid, with slender, somewhat compressed bases, cusps compressed to sharp edges, outer cusp turned outward so as to give an inflated appearance at the top, arranged in about 72 rows, counting lengthwise on each jaw, or 10 rows transversely, from outer to inner. Pharyngeal teeth simple, in 2 bunches of 8 or 10 rows at the esophagus on the roof of the mouth, and below these on the floor in 2 smaller elongate groups. Nostrils small, tubes short or absent, posterior between the anterior halves of the eyes, anterior in front of these about 1 diameter of the orbit, and twice the same distance from each other. Eye small, less than ⅛ of head. Gills 3½. Gill opening a vertical slit, extending downward a short distance on 1 or 2 rays only of the base of the pectoral (not so wide as in *L. pulchellus*). Skin thin, loose. Backward from the vent the form is much compressed, the thickness being nearly ½ of the height, and both lateral and dorsal outlines taper regularly to the caudal. Dorsal, anal, and caudal fins confluent, anal extending farther on the caudal, i. e., more than ½ the length of the latter; dorsal commencing above the gill opening, at a distance from the snout that is contained in the total length without the caudal 3⅖ times; anal beginning a trifle in advance of the mid length, excluding the caudal; pectoral broad, not reaching the anal, upper portion rounded, lower fringed, a shallow indentation between the two portions; caudal subtruncate, rounded, with rays more than ½ as long as the head; ventral disk small, ¼ longer than broad, situated its length from the lips, occupying nearly ⅓ of the distance from the snout to the first ray of the anal, or about ⅛ of the total length. Color dark brown, irregularly marked with whitish or grayish; a series of 5 or 6 spots, each as large as the eye, along the middle of the flank; below these, near the lower edge, there are indications of 4 or 5 whitish blotches, resembling transverse bands; dorsal, anal, and caudal with irregular cloudings and blotches of darker and of lighter; base of pectoral with a couple of large blotches of light grayish, balance of the fin freckled with light color; head dark, somewhat reddened. Entire length 10 inches. (Garman.) North Pacific; common south to Unalaska; the original types above described were collected by Messrs. Pierce and Smith at Saghalien, Channel of Tartary; our specimens collected by the *Albatross* in Bristol Bay. Dr. Bean's types of *Liparis gibbus* came from Plover Bay, Siberia; others are recorded from Unalaska, St. Paul Island, off Indian Point, Cape Chaplin, Eastern Siberia, Petropaulski, and Bering Strait.

The following is the substance of the account of *Liparis gibbus* which Garman identifies, apparently correctly, with *Liparis agassizii:*

Head 3½; depth 3½. D. 42; A. 36; P. 85; C. 12. Body abruptly contracted near the vent, covered with lax skin; interorbital space shallow-concave, the vertex and nape somewhat elevated; snout depressed; head as wide as long, longer than deep; nostrils tubular, the tubes of anterior nostrils longest; eye small, 4 in head; ventral disk nearly circular, 8 in length; vertical fins confluent; dorsal continuous; longest dorsal ray ½ as long as head; pectorals reaching front of anal; caudal 6 in body. Head and body very pale brown or gray, paler below; head and anterior parts sometimes with concentric brown rings, much as in *Liparis pulchellus;* sides plain or marked with brown stripes and rings; tail sometimes with dark blotches; vertical fins usually with dark bands. Bering Sea, Aleutian Islands, and Siberia. (Named for Prof. Louis Agassiz).

Cyclopterus liparis, BLOCH, Ausländ. Fische, I, 48, 1785, in part, Pacific specimens.

Liparis agassizii, PUTNAM, Proc. Amer. Assoc. Adv. Sci. 1874, 339, Saghalien, Channel of Tartary (Coll. Pierce and Smith); GARMAN, Discoboli, 62, pls. 1–3, 1892.

Liparis gibbus, BEAN, Proc. U. S. Nat. Mus. 1881, 148, Unalaska, St. Paul Island, Indian Point, Cape Chaplin, and Plover Bay, Siberia; JORDAN & GILBERT, Synopsis, 741, 1883.

2454. LIPARIS HERSCHELINUS, Scofield.

Head 3½ in body; depth 3¾. D. 42; A. 33; pectoral 35; caudal 10; eye 4½ in head, and 1½ in snout; interorbital space 3 in head; maxillary 2 in head. Body tadpole-like; head rounded and very little compressed; abdomen slightly distended; just back of the abdomen the body is suddenly compressed to a width equaling ½ its height, and from this point the body gradually tapers to the caudal, its height and width keeping the same proportions; the height of the base of the caudal equals the diameter of the eye; the maxillary extends to posterior edge of eye, and its end is concealed in the base of the skin of the head; upper jaw slightly longer than lower; teeth tricuspid; interorbital space flat; nape slightly elevated; gill openings small; the width of the slit equaling the interorbital space; the lower edge of the slit even with the first pectoral ray; the posterior nostrils end in very short, compressed tubules about ½ diameter of eye in front of eye; the anterior nostrils are simple and placed directly in front of the posterior nostrils a distance equal to ½ diameter of eye. The dorsal begins on a vertical line drawn from posterior edge of gill flap; the anterior rays are short, gradually lengthening till middle of fin is reached, where the rays equal 2½ times the diameter of the eye, the last rays scarcely shortened and not forming a notch at its junction with the caudal; last rays encroaching on the caudal for ¼ of its length; anal same shape as dorsal and of same height, its last rays encroaching on caudal for ⅓ its length; upper lobe of pectoral composed of 25 rays, the eleventh and longest ray 1½ in head; length of twenty-fifth ray 4 in head, lower lobe with 10 rays, of which the third from the last, or twenty-third, is the longest, being contained in the head 2⅒ times; membrane between each 2 of the last 4 rays incised; caudal slender, rounded behind, its length a little more than twice in head. Diameter of ventral disk 8 in body. Skin very loose, attached only at opening and to ends of last rays of dorsal and anal and to base of caudal. Color dark, covered with fine punctulation; belly and underside of head free from markings; last half of dorsal darker than anterior half; anal mottled with black; caudal with 2 black vertical bands, the first bony and just back of tips of last dorsal and anal rays; the second band slender and faint and at top of fin. Arctic Ocean; several specimens were taken at Herschel Island. The longest specimen is 2½ inches long. This species is nearest *L. tunicatus* from the coast of Greenland, and appears to be intermediate between it and *L. agassizii.*

Liparis herschelinus, SCOFIELD, Fishes of Herschel Island, in Jordan & Gilbert, Rept. Fur Seal Invest., 1898, Herschel Island, Arctic Ocean. (Type, No. 5601, L. S. Jr. Univ. Mus. Coll. N. B. Scofield.)

2455. **LIPARIS DENNYI**, Jordan & Starks.

Head 3⅗ in length of body; depth 4½. D. 39; A. 30; pectoral 36; caudal 12; eye 8 in head; maxillary 2⅕; snout 2¾; gill opening 2⅖; upper pectoral lobe ⅓; lower lobe 1½; intervening rays 2¼; ventral disk 2⅓; highest dorsal rays 2⅖; highest anal rays 2⅖; caudal rays 1¾. Body moderately elongate, much compressed posteriorly, slightly so anteriorly; head moderate, the cheeks and nape prominent. Mouth wide, with little lateral cleft; maxillary extending to below the anterior margin of eye, its end covered with the skin of the head; the lower jaw slightly the longer; the teeth tricuspid, those on the inner part of jaw largest, arranged in about 14 series in each jaw; series nearly transverse on middle of jaw, becoming more and more oblique toward the sides, where they are nearly parallel with the sides of the jaws; interorbital wide, slightly concave; nostrils ending in very short, wide tubes, the posterior over the anterior margin of eye, the anterior in front of it a distance equal to the diameter of eye; opercle ending in a short, wide spine covered with skin; it is situated slightly above the middle of gill opening; gill opening running from about the eleventh pectoral ray to a level with the eye. Origin of dorsal slightly behind base of pectoral, its distance from the snout 3⅕ in length of body, its anterior rays short, gradually lengthening posteriorly, the rays from the anterior third to near the end about equal, the last ray abruptly shortened, forming a slight notch where the fin joins the caudal; posterior ⅔ of caudal free above; anal similar to dorsal, about the same height, its origin nearer snout than base of caudal, about under the base of the tenth dorsal ray, posteriorly it is longer than the dorsal, joining the caudal at about ½ its length; ventral disk nearly round, its distance from tip of lower jaw 1⅓ in its diameter, 1 in distance from vent, 2 from first anal ray; vent midway between front of anal and edge of disk; upper lobe of pectoral broadly rounded, reaching to ⅔ of the distance between vent and front of anal; lower lobe long, reaching nearly to vent; caudal long and slender, rounded behind. Skin very thin and loose on body and head, covering the anterior parts of dorsal and anal, attached at about the middle of rays posteriorly, and covering the base of caudal rays. Color light brown, lighter below, thickly covered with minute brown points, which form spots and mottlings on sides; upper part of head dark, lips spotted with brown; dorsal and anal dark brown, slightly mottled with lighter; pectoral light, with irregular brown spots and bars running across it; caudal dark brown, mottled at base, 2 light bars crossing it toward its end, leaving a narrow posterior margin of brown. North Pacific, south to Puget Sound; numerous specimens in the *Albatross* collections from about Unalaska. (Named for Mr. Charles L. Denny, of Seattle, in recognition of his active and intelligent interest in the natural history of Washington.)

Liparis dennyi, JORDAN & STARKS, Proc. Cal. Ac. Sci. 1895, 835, pl. 98, Admiralty Inlet, Puget Sound. (Type, No. 3703, L. S. Jr. Univ. Mus. Coll. Young Naturalists' Society of Seattle.)

2456. LIPARIS CYCLOSTIGMA, Gilbert.

Head $3\frac{3}{5}$; depth $4\frac{1}{2}$. D. 44; A. 34; P. 42; C. 14. A robust, compressed species, with broad, gently convex head, the nape rather elevated, comparatively wide gill opening, a single continuous dorsal fin, the dorsal and anal broadly joined to the caudal, and the coloration peculiar. Profile gently and evenly declining from nape to end of premaxillary processes, thence descending more steeply to tip of snout. Interorbital space very wide, equaling length of snout and $\frac{1}{2}$ of eye, $2\frac{2}{5}$ in head. Distance from tip of snout to front of exposed portion of eye, $2\frac{9}{10}$ in head. Mouth terminal, broad and transverse, with but little lateral cleft, the 2 jaws equal, the lower not included. The maxillary is entirely bound down by skin of head, reaching vertical from front of pupil, the angle of mouth in advance of eye. Bands of teeth extremely broad, the teeth very small, all tricuspid, the outer ones minute, those toward inner margin of jaw increasing in size. The anterior series in each jaw are nearly transverse, the lateral series becoming successively more and more oblique, the uppermost nearly parallel with the jaw; about 20 series in each side of lower jaw, 30 on each side of upper jaw. The width of band in upper jaw equals $\frac{2}{3}$ diameter of exposed portion of eye, which is $\frac{1}{4}$ length of snout, $\frac{2}{7}$ interorbital width. Nostrils without tube. Lower lip distinct on lateral $\frac{3}{5}$ or $\frac{2}{3}$ of mandible. Gill opening wide, extending downward to opposite base of fifteenth pectoral ray, the length of the slit $2\frac{2}{5}$ in head. Upper jaw with a series of large pores; lower jaw short, with few pores. Disk large, oblong, its longitudinal diameter $2\frac{1}{3}$ in head, equaling its distance from anus and twice distance of latter from base of first anal ray. Pyloric cæca 28. Pectoral very broad, inserted low, its upper margin on a level with premaxillaries, much below the eye; the rays decrease but little in length from the first to the twentieth, and form a very broad, evenly rounded lobe. Below the twentieth the rays decrease gently and have exerted tips, until the shortest ray equals $\frac{2}{3}$ the long upper rays. There follow 3 or 4 somewhat longer rays, the tips still further exserted, then 4 or 5 rays which decrease rapidly, the shortest anterior one equaling diameter of eye; longest pectoral ray $1\frac{1}{7}$ in head; base of first dorsal ray in a vertical passing through axil of pectoral; longest dorsal ray $1\frac{2}{5}$ in head, the last rays rapidly shortened so as to produce a notch at union with the caudal, the last ray less than $\frac{2}{3}$ the longest, the membrane joining at end of basal third of caudal; the anal fin is equal in height to the dorsal, but the last rays are but little shortened, so that no notch exists posteriorly. It forms a much broader union with the caudal, which it joins at the end of its basal two-thirds; caudal broad, rounded, the outer rays $\frac{4}{5}$ the length of middle rays, which equal the length of head without the snout. Body everywhere transparent, gelatinous in structure. Colors in life, olivaceous above, overlaid with light grayish; belly and lower side of head light yellow; body and fins with large brownish-red or blood-red spots and blotches, usually roundish, each having a darker margin surrounded with a light ring. Length 360 mm. Bering Sea; type from Bristol Bay, in 29½ fathoms; a second specimen from St. Paul Island, and a third still larger from Petropaulski; a most beautifully colored species, quite unlike the others. (Gilbert.) (*κύκλος*, round; *στίγμα*, spot.)

Liparis cyclostigma, Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 446, Bristol Bay, Alaska, at Albatross Station 3252, in 29½ fathoms. (Type No. 48621.)

Subgenus LYOLIPARIS, Jordan & Evermann.

2457. LIPARIS PULCHELLUS, Ayres.

Head 4½ in length; depth 4½. D. 47 to 49; A. 40; pectoral 36; caudal 12; eyes 6 in head; interorbital space (flesh, not bone) 2; snout 3; pectoral $1\frac{1}{8}$; ventral disk 2¾; caudal $1\frac{4}{5}$. Body elongate, somewhat compressed, tapering gradually to the caudal. The head is broader and longer than high; snout subtruncate, overhanging the mouth; teeth small, tricuspid, the median cusp longest, arranged in oblique rows as in the related species; upper lip complete, the lower interrupted on each side about midway between middle of jaw and angle of mouth; interorbital space wide and flat, posterior nostril ending in a short, wide tube, anterior smaller, closer together, about midway between the posterior and end of snout; gill opening moderate, wider than eye, its lower third in front of pectoral, extending downward to the third or fourth ray; skin thin and loose, as in the other Liparids; vent nearer to anal than ventral disk. Dorsal and anal confluent with the caudal, which seems to end in a point when not spread; origin of dorsal just behind base of pectoral, its distance from snout contained 4 times in the length of body, the anterior rays buried under the skin; origin of anal nearer snout than base of caudal fin; pectorals broadly rounded posteriorily, reaching to front of anal, the lower rays smaller and produced, forming a notch in lower part of fin. Color light olive brown, with numerous waving lines everywhere on head and body, running longitudinally, sometimes running together and forming irregular markings; belly and lower parts of head white; dorsal and anal dusky, with longitudinal stripes and mottlings; caudal dark at tip; pectorals with irregular cross streaks. Others are light brownish with spots of darker, not showing any trace of the longitudinal stripes; the head variously marked with irregular vermiculations. Here described from specimens from Point Reyes, California. The one from which the measurements are taken is a little over 4 inches in length. Specimens vary greatly in depth of body. Length 10 inches. Northern Pacific, Alaska to Monterey.* Common; specimens are recorded from Puget Sound and from Tongass, St. Paul, Kadiak, Unalaska, and other localities in Alaska. The specimen from the northernmost locality examined by us is from Bristol Bay in 16 fathoms (Coll. *Albatross*). The species is not rare about San Francisco and Monterey, where the striped form is almost exclusively found. (*pulchellus*, pretty.)

Liparis pulchellus, AYRES, Proc. Cal. Ac. Nat. Sci., I, 1855, 23, San Francisco; GÜNTHER, Cat., III, 164, 1861; STEINDACHNER, Ichth. Beiträge, III, 53, 1875; JORDAN & GILBERT, Synopsis, 741, 1883; GARMAN, Discoboli, 67, pls. 4, 5, and 8, 1892.
Cyclogaster pulchellus, GIRARD, Pac. R. R. Rept., X, Fishes, 132, 1858.

Subgenus ACTINOCHIR, Gill.

2458. LIPARIS MAJOR (Gill).

Head 4 in length. D. 45 to 48; A. 38 to 40; P. 34 to 37; caudal 12 to 14; vertebræ 52 (10+42); cæca 26; branchiostegals 6. Body elongate, much compressed and tapering posteriorly, rather thin behind the abdomen, slender at the base of the caudal, broad and high between the pectorals. Head high and broad, prominent at nape, length a little more than depth, forehead depressed; snout broad, blunt, rounded, rather deep, as long as eye; mouth anterior, broad, maxillary subtending the eye, jaws about equal; a broad interruption in lower lip in middle of chin; teeth small, in pavement, tricuspid in younger specimens, simple in old. Some of those from which this description is drawn show the 3 pronged teeth in the outer rows, and an approach to the simple in the inner. A series of 5 or 6 pores on each side, just above upper lip, from snout to postorbital region; another of 6 or 7 pores from chin toward upper angle of gill opening; posterior nostril reduced, pore-like, on interorbital space; anterior in front of eye, tubular; between and a little in front of the tubes a couple of large pores. Eye moderately large, in anterior half of head, lateral, about equal to snout, once in interorbital space, 1¼ times in disk, and 3½ in head; disk small, little longer than wide, 1¼ times as long as eye, distant from mouth 1⅓ times the length, which is equal to ½ distance to anal fin; vent about midway from disk to first ray of anal; gill opening little wider than eye, ⅓ of its extent in front of base of pectoral; 1 single and 3 double gills; pseudobranchiæ small; opercular spine rather broad; skin thin, loose, easily carried away, that of the males in breeding season roughened with small, spine-bearing papillæ; dorsal and anal continuous with the caudal, the union occupying nearly ½ length of last, anal extending a little farther back than dorsal. Caudal rays less than ⅔ as long as head, hinder margin of the fin slightly rounded, narrow; pectorals broad and rounded in the upper portion, reaching anal fin; in the lower portion fringed; several of the rays at sides of disk, much longer than those immediately above them, form a notch in the margin, a fold uniting the fins in front of disk; no apparent notch in dorsal; like the anal, it rises gradually, and attains its greatest extent in the posterior third of its length. Professor Lütken gives the following as the formula: Dorsal 43 to 49; anal 36 to 40; pectoral 32 to 38; caudal 9 to 11. The specimens described here, and from which the numbers placed at the head of this description were taken, were furnished this Museum by him. From his large series he finds a greater range of variation in all cases except that of the caudal, where 12 to 14 rays appear on these examples. Color olivaceous to dark brown, darkest about the head and body. On close examination the skin is seen to be thickly puncticulate with brown, in cases forming cloudings, blotches, or transverse bands on the fins and hinder parts of the body. In life there is no doubt of the presence of tints of lilac, reddish, or yellowish. One of these specimens has 6 bands of brownish on the dorsal, and 4 on the anal. Our largest is 5 inches in length. (Garman.) Coasts of Greenland, east to the White Sea; not seen by us; the description from a specimen in the Museum Comp. Zool., sent by Dr. Lütken. (Eu.) (*Major*, larger.)

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* Our Monterey specimens have D. 48; A. 39; P. 36; C. 12. Head 5; depth 5.

Cyclopterus liparis major, FABRICIUS, Fauna Grönland., 136, 1780, Greenland; WALBAUM, Artedi Piscium, III, 489, 1792; after FABRICIUS; not a binomial name, *major* being simply an adjective.
Liparis tunicata, KRÖYER, Naturh. Tidsskr., I, 236, 1862; not of REINHARDT.
Actinochir major, GILL, Proc. Ac. Nat. Sci. Phila. 1864, 193, Greenland.
Liparis fabricii, LÜTKEN, Kara-Haves, Fiske, 146, 1887.
Liparis major, JORDAN & GILBERT, Synopsis, 741, 1883; GARMAN, Discoboli, 72, 1892.

786. BATHYPHASMA, Gilbert.

Bathyphasma, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 447 (*ovigerum*).

Teeth long, slender, simple, without basal cusps. Disk large, its surface even, with evident lobes or horny papillæ under posterior part of the head; the anus not immediately behind it. Gill opening comparatively wide. Caudal long, well developed, not acuminate, containing 12 rays, the dorsal and anal confluent with its basal ⅖; pectoral broad and continuous, as in *Liparis*, the lower rays exserted. Suborbital process strong. Vertebræ numerous. The typical species has much the shape and general appearance of *Liparis agassizii*. The character of the simple teeth, which this genus shares with *Paraliparis* and others, has been independently acquired. (Gilbert.) Skeleton soft, little ossified. Deep-sea Liparids of large size, the dentition unlike that of the other genera, and apparently not acquired by the same line of descent as the simple teeth of *Paraliparis*, which seems to be a degradation of the form seen in *Liparis*. (*βαθύς*, deep sea; *φάσμα*, apparition.)

2459. BATHYPHASMA OVIGERUM, Gilbert.

Head 3⅗; depth 3⅗; eye 7. Occipital region greatly elevated, the upper profile of head strongly decurved above the orbits, a line from occiput to end of premaxillary processes forming an angle of 45 degrees with axis of body. In front of tips of premaxillary processes the snout descends almost vertically. Posteriorly the body tapers uniformly and slowly, the width of base of tail equaling ½ diameter of eye. Mouth large, horizontal, not overpassed by the snout, the lower jaw slightly shorter than the upper, not distinctly included; maxillary reaching a vertical from posterior edge of orbit, its length 2⅓ in head, its width 1⅚ in head; upper lip complete, the fold of lower lip extending halfway from angle of mouth to symphysis. Bands of teeth very wide in the front of each jaw, becoming narrow laterally, where the series are few in number and nearly parallel with the jaw; anteriorly the series grow more and more oblique, until at front of jaw they are nearly transverse; teeth all simple and slender, without cusps, directed very obliquely backward, and movable, implanted so as to admit of still further depression; outer teeth in both jaws very short, the inner ones growing gradually longer and becoming acicular, 16 series of teeth on each side of lower jaw, 22 series on each side of upper jaw. Posterior nostril in a short wide tube. Eye large, the diameter of its exposed portion 2½ in total interorbital width. Cheek and temporal region swollen, the suborbital stay running in a notable depression between the two. Gill slit wide, extending downward to opposite upper pectoral rays, longer than snout, 2⅔ in head. Mucous pores minute, on sides of snout, mandible, and preopercle, none visible on top of head. Disk large, nearly round, its center slightly in advance of gill slit, its length 3⅓ in head, distance from its posterior margin to vent equaling ⅘ its own diameter. A small anal papilla. Pyloric cæca 19. Pectoral with 34 rays, not notched, the lower rays regularly diminishing in length to the fifth or sixth before the last, the next 2 or 3 abruptly lengthened and exserted; longest ray of upper lobe equaling snout and eye; longest ray of lower lobe equaling snout and ½ eye; dorsal fin beginning slightly behind upper axil of pectorals and with 43 rays, the longest equaling distance from tip of snout to front of pupil; origin of anal fin with ½ diameter of eye in front of middle of body, with 34 rays; caudal ray long and slender, with 12 rays, its basal ⅖ confluent with dorsal and anal, its length equal to that of pectoral fin. Skin thin, not conspicuously lax. Head, body, and fins white, inconspicuously mottled with light brown. A single specimen, 315 mm. in total length, from Station 3342, off Queen Charlotte Island, British Columbia, depth 1,588 fathoms. The type is a male, with well-developed testes, and contained in its mouth, when captured, a spherical mass of eggs apparently of the same species. The eggs measured 4½ mm. in diameter, and were well along in their development, the embryos distinctly visible through the very tough egg membranes. The general form of head and body can be made out, as well as the long continuous dorsal and anal fins running backward into the tail. It seems not improbable that the male fish protect the eggs in this manner until after hatching. (D. 43; A. 34; P. 34; C. 12.) (Gilbert.) (*ovum*, egg; *gero*, I bear.)

Bathyphasma ovigerum, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 448, off Queen Charlotte Island, at Albatross Station 3342, in 1,588 fathoms. (Type, No. 48622.)

787. CAREPROCTUS, Kröyer.

Careproctus, KRÖYER, Naturh. Tidsskr., I, 257, 1862 (*reinhardi*).
Caremitra, JORDAN & EVERMANN, Check-List Fishes, 452, 1896 (*simus*).
Allochir, JORDAN & EVERMANN, Check-List Fishes, 452, 1896 (*melanurus*).
Allurus, JORDAN & EVERMANN, Check-List Fishes, 452, 1896 (*ectenes*).

Body more or less elongate, semitransparent, covered with thin, lax skin; mouth terminal; teeth simple in the adult, hooked; ventral disk very small, situated far forward, under front of eye, sometimes reduced to a mere point; vent a little behind it, far in front of anal fin; pectoral fin broad, notched, the lower lobe well developed. Vertebræ and fin rays numerous; nostrils with or without tube. Species of rather large size, found in deep or cold waters. These form a transition from *Actinochir* to the *Amitrinæ*, in which group the ventral disk is wholly lost.

Concerning *Careproctus*, Mr. Garman has the following remarks:

"This genus and *Liparis* are brought very close together by *Careproctus liparis major*. The simple form of tooth in the one case and the tricuspid form in the other were formerly considered sufficiently distinctive for separating these genera. Lütken, 1887, pointed out that the young of the mentioned species has the tricuspid teeth of *Liparis*, and that with age it acquires the simple teeth of *Careproctus*. It is possible that a similar change takes place in the other species we have brought together in the latter. Indeed, assuming derivation from species of *Liparis* of the shoal waters, it is just what we should expect in all these *Careprocti* of the deep sea.

"Besides the dentition, other features may be selected that in comparisons may serve to distinguish this genus from the preceding: The head is higher at the back; the body is deeper in front of the dorsal fin; the caudal region is longer, more slender and tapering; the vertebræ are more numerous; the dorsal and anal fins have more rays, and are completely fused with the caudal; the disk is reduced in size; the suborbital process is less developed, and apparently the intestine is shorter. Among these differences there is none that may not be a consequence of the modifying influences of great depths upon species of *Liparis* such as now exist along the coasts." (*καρά*, head; *πρωκτός*, anus.)

CAREMITRA (*καρά*, head; *μίτρα*, stomacher):

a. Body short and deep, with blunt head, the inferior mouth below the prominent snout; disk nearly as long as eye; pectoral rays 33. SIMUS, 2460.

aa. Body more or less elongate.

b. Body not excessively attenuate, its median depth much more than length of eye.

CAREPROCTUS:

c. Pectoral fin distinctly notched, its middle rays shorter than upper or lower.

d. Lower pectoral rays extremely long, reaching front of anal; disk moderate, about as large as eye. COLLETTI, 2461.

dd. Lower pectoral rays not reaching anal.

e. Mouth horizontal or moderately oblique, not nearly vertical.

f. Disk nearly or quite as long as eye, not excessively reduced.

g. Disk about ½ longer than eye; anterior nostril with a tube; gill slit reduced; mouth oblique; D. 53; P. 34. PHASMA, 2462.

gg. Disk not larger than eye, which is about 4 in head; anterior nostril (so far as known) without tube.

h. Depth 4 in length; mouth large; D. 52; A. 47. SPECTRUM, 2463.

hh. Depth 5½ to 6.

i. Pectoral rays 32; D. 54; A. 45. REINHARDI, 2464.

ii. Pectoral rays 38; D. about 48; A. about 48. RANULA. 2465.

ff. Disk very minute. OSTENTUM, 2466.

ee. Mouth nearly vertical; body elongate. D. 50; A. 45; C. 6; P. 30. GELATINOSUS, 2467.

ALLOCHIR (ἄλλος, other; χείρ, hand):

cc. Pectoral fins not notched, the middle rays not shorter than upper or lower; gill openings reduced; depth 4½ in length. D. 58; A. 50; P. 30. MELANURUS, 2468.

ALLURUS (ἄλλος, other; οὐρά, tail):

bb. Body excessively elongate, its depth at the middle not more than diameter of eye; disk smaller than eye; gill openings reduced; snout shovel-shaped. D. 51. ECTENES, 2469.

Subgenus CAREMITRA, Jordan & Evermann.

2460. CAREPROCTUS SIMUS, Gilbert.

A species with a very heavy head and body, an inferior transverse mouth, overlapped by the thick, rounded snout. Appearance much that of *Rhinoliparis barbulifer*, but the anterior parts much heavier, nape more elevated, snout shorter and blunter, without barbels, extending beyond front of eyes for a distance (measured axially) equal to ⅔ diameter of orbit, and projecting beyond mouth for ½ that distance. Mouth transverse, its width nearly twice the distance from symphysis of lower jaw to angle of mouth, the latter reaching a vertical midway between front of eye and pupil. Teeth indistinctly tricuspid, in narrow bands, 11 or 12 series in each half of lower jaw, 8 or 9 in the upper. Nostrils without tube. Eye large, 3 in head, equaling snout, 1½ in total interorbital width. Gill slit moderate, ⅖ of it opposite upper pectoral rays, its width ⅔ diameter of eye. Opercle prolonged into an acute lobe overlapping middle of slit. Disk rather small, round, under posterior part of eye, its diameter 7/9 that of eye. Vent immediately behind it, equidistant from front of anal and angle of mouth. Pectorals inserted high, the upper edge on a level with the middle of eye, continuous, the median rays greatly shortened, the lower ones again longer, with exserted free tips; upper lobe extending beyond front of anal, and equaling length of head behind snout, lower rays ⅔ length of upper ones; P. 33; origin of dorsal fin just behind axil of pectorals, continuous posteriorly with the caudal fin, which is very narrow and not distinct; origin of anal at end of first third of length. Whitish or bright brown, dusky posteriorly on body and fins; mouth, gill cavity, and peritoneum white. One specimen, 3½ inches long, from Bering Sea north of Unalaska Island. (Gilbert.) (*simus*, σιμός, snubnosed.)

Careproctus simus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 444, Bering Sea north of Unalaska, at Albatross Station 3331, in 350 fathoms.

Subgenus CAREPROCTUS, Kröyer.

2461. CAREPROCTUS COLLETTI, Gilbert.

Head 5, blunt and heavy, with subvertical cheeks and bluntly rounded snout, the latter not projecting beyond the mouth; greatest depth (at occiput) 6; eye equals length of snout, 3¾ in head, 1⅗ in interorbital width; nape not elevated; mouth terminal at lower side of snout, slightly oblique, its lateral cleft about ⅔ its width; lower jaw shutting within the upper; angle of mouth reaching a vertical midway between front of eye and front of pupil; teeth lanceolate, acute, without trace of basal cusps; gill opening a narrow slit, entirely above base of pectorals, its length ¾ diameter of eye; opercle produced posteriorly into a rounded lobe, which overlaps the gill opening; disk oblong, of moderate size, placed under the posterior part of head behind the eyes, forming, in alcoholic specimens, a very deep cup-shaped depression with incurved edges; diameter of disk about equaling that of eye; disk separated from vent by ½ its diameter; upper pectoral lobe reaching origin of anal fin, the rays of lower lobe elongate, extensively free, longer than upper lobe, and reaching to or nearly to front of anal; intermediate rays not as short as in *C. reinhardi,* hardly forming a separate division of the fin, the rays being gradually and uniformly shortened from above downward to origin of lower lobe; pectoral rays 29; dorsal beginning immediately behind the head; distance from tip of snout to origin of anal 3⅔ in length; series of conspicuous mucous pores on head, as in *C. reinhardi.* Color in spirits, dusky, the tip of snout, under side of head, opercles, abdomen, and posterior portion of vertical fins black; inside of mouth and gill cavity dusky; peritoneum black. Closely related to *C. reinhardi,* from which it differs principally in the elongation and exsertion of the lower pectoral rays. These extend in all specimens to or nearly to the origin of the anal fin, and are always free for the greater part of their length. Length 3½ inches. North Pacific, south of the Alaskan Peninsula. ("Named in honor of Prof. Robert Collett, the distinguished author of the Fishes of the Norwegian North Atlantic Expedition.")

Careproctus colletti, Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 442, south of the Alaska Peninsula, at Albatross Station 3338, in 625 fathoms. (Type, No. 48698.)

2462. CAREPROCTUS PHASMA, Gilbert.

Eye 4 in head, 2 in total interorbital width. D. 53; P. 34. Head broad and flat above, subquadrate, with nearly vertical cheeks. Snout very obtuse, broadly rounded, much blunter than in *C. spectrum,* very slightly overlapping the mouth; width of snout 1⅞ in length of head; mouth very broad, somewhat oblique, reaching vertical slightly behind front of eye, its width more than twice the amount of lateral cleft taken axially. Teeth minute, acute, in a moderate band in each jaw, arranged in oblique series within the band. Nostrils opening in a short but conspicuous tube (the tube absent and the pore smaller in *C. spectrum*). Mucous pores small. Gill slit short, slightly less than diameter of orbit, its inferior end attached to base of upper pectoral ray, overlapped for almost its entire extent by the broadly rounded opercular flap. Sucking disk comparatively large, much larger than in *C. spectrum,* 1½ times diameter of eye, 3⅓ in head, very nearly round, the transverse diameter equaling or slightly exceeding the longitudinal diameter. Vent immediately behind edge of sucking disk; anal papilla slender, ½ as long as diameter of eye. Pectoral fin very broad, barely reaching front of anal, the lower rays equaling the upper, extensively free at tip; lower lobe of pectoral containing 8 or 9 rays; dorsal beginning behind gill opening at a distance equaling diameter of eye. Skin exceedingly soft, thick, and lax, in alcoholic specimens forming folds on head and body and concealing the rays of the fins. Color uniform white in spirits. Closely related to *Careproctus spectrum*, Bean, from the same region, differing in the much larger sucking disk and the narrower gill slit, the latter confined to area above base of pectorals, its anterior margin formed of the broadly and evenly rounded opercular lobe. Length 3½ inches. Bristol Bay, Alaska, in deep water. (*φάσμα*, a spectre.)

Careproctus phasma, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 443, Bristol Bay, Alaska, at Albatross Stations 3254 and 3256, in 46 and 49 fathoms.

2463. CAREPROCTUS SPECTRUM, Bean.

Head 4; depth 4; eye 3. D. 52; A. 47; ventral disk small, ⅔ as long as eye. Mouth large, the maxilla extending to about below the middle of eye. Pectoral reaching to above anal origin; dorsal beginning over the axil of pectoral. Color along back of some examples light brown, elsewhere uniformly pale. Length of type 3$\frac{9}{10}$ inches. Twenty-six specimens were obtained, July 31, 1888, between Unga and Nagai islands. (Bean.) Garman refers this species to the synonymy of *Careproctus gelatinosus*, which is probably not correct. (*spectrum*, spectre.)

Careproctus spectrum, BEAN, Proc. U. S. Nat. Mus. 1890, 40, between Unga and Nagai islands, 55° 10′ N., 160° 18′ W., at Albatross Station 2848, in 110 fathoms.

2464. CAREPROCTUS REINHARDI (Kröyer).

Head 4½; depth 5½; eye 5 to 6. D. 54; A. 45; C. 12; P. 32. Body semi-transparent, covered with viscid skin. Head short and globular. Caudal fin very slender, joined to the dorsal and anal; mouth nearly horizontal; lower jaw scarcely projecting. Ventral disk little larger than eye. Pectoral deeply emarginate, nearly as long as head, reaching anal, the lower rays exserted, appearing as a series of short twisted filaments. Distance from ventral disk to vent not more than diameter of eye; head with conspicuous mucous pores. Color pale reddish gray, unmarked. (Collett.)

Mr. Garman adds to this: Body translucent, jelly-like; skin lax, viscid; teeth simple; ventral disk very small, situated far forward, almost hidden by the anterior portions of the pectorals; vent near the disk, about midway from snout to anal; tail long, slender, tapering to a point; caudal continuous with dorsal and anal; fin rays soft, slender; pectorals semicircular, below the head, beginning far in front and close together near the symphysis of the lower jaw, first 8 or 10 rays projecting, larger median portion with short ones, upper elongate; eyes comparatively large, more than ¼ as long as the head, which latter is ¼ to ⅕ of the total length. Only 1 pair of nostrils was detected, and they were not prolonged in tubes. Color pale reddish gray, or whitish; no bands or marks. An Arctic, deep-sea form, descending to 700 fathoms. Known from Greenland, Jan Mayen, and Beeren Island. (Named for Professor J. Reinhardt, of the University of Copenhagen, who wrote largely on the fauna of Greenland.)

Liparis gelatinosus, REINHARDT, Oversigt, etc., 1844, 77; not of PALLAS.
Liparis (*Careproctus*) *reinhardi*, Kröyer, Naturh. Tidskr., I, 252, 1862, Greenland.
Careproctus reinhardi, COLLETT, Norske Nord-Havs Exped., 57, 1880; JORDAN & GILBERT, Synopsis, 957, 1883; GARMAN, Discoboli, 78, 1892.

2465. CAREPROCTUS RANULA (Goode & Bean).

Head 4; depth 6. D. 48±; A. 48±; pectoral 15 + 12 or 13. Body thick, subcylindrical anteriorly, rapidly tapering to the tail; skin thick, lax. Head swollen at the nape; width little greater than depth, twice that of disk; length of disk 2½ interorbital width. Snout broad, about ¼ as long as head; mouth cleft not reaching a vertical from orbit; upper jaw the longer; eye lateral, not interfering with upper profile, about ¼ of head; nostril near the eye; from snout to first dorsal ray ⅓, and from snout to first anal ray about ⅖ of length of body; origin of anal below eighth ray of dorsal; disk slightly longer than its distance from the snout, or than its width. Color uniform, whitish. Off Halifax Harbor, in 52 fathoms. (Goode and Bean.) Garman refers this species to the synonymy of *Careproctus reinhardi*, which may be correct. (*ranula*, tadpole, diminutive of *rana*, frog.)

Liparis ranula, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 46, Hallfax; JORDAN & GILBERT, Synopsis, 742, 1883.

2466. CAREPROCTUS OSTENTUM, Gilbert.

The snout is longer and more pointed than in *Careproctus phasma* or *Careproctus spectrum*, its width little greater than its length, 2¼ in head. Mouth with very distinct lateral cleft, its width less than its length. Maxillary reaching a vertical line crossing orbit behind pupil, $1\frac{9}{10}$ in head; teeth minute, in narrow bands, indistinctly tricuspid; eye equaling length of snout, 1½ in total width of interorbital area. The true bony interorbital width is much narrower than this. In the specimen examined the epidermis of the head is largely lost, and the width of the gill slip can not be determined. A short nostril tube. Fins as in *C. spectrum* and *C. phasma*. Skin loose, thinner than in *C. phasma*. Color white or slightly brownish, minutely punctulate with black. Differing from *C. spectrum* in the minute size of the sucking disk, which is reduced to a mere rudiment entirely concealed by the anterior (lower) lobes of the pectoral fins, about one millimeter in diameter in a specimen 78 mm. long. Bering Sea, north of Unalaska Island, in deep water. (*ostentum*, a spectre.)

Careproctus ostentum, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 444, Bering Sea, north of Unalaska Island, at Albatross Stations 3324 and 3331, in 109 and 350 fathoms. (Type, No. 48619.)

2467. CAREPROCTUS GELATINOSUS (Pallas).

D. more than 50; A. about 45; C. 6; cæca 48; vertebræ 64. Vertical fins contiguous. Ventral disk small, supported by a bilamellated cartilage, which descends from the throat. Body oblong, compressed, thicker toward the head and thinner toward the tail, semitransparent, exceedingly soft, like jelly. Head thick, somewhat depressed, flat on the vertex, and convex between the orbits. Eyes directed upward; nostrils in middle between margin of mouth and orbit, with a small tubular appendage; a series of pores along upper lip toward gill opening. Lips thick; cleft of mouth directed upward, as in *Uranoscopus*, but with the lower jaw less prominent; jaws, palate, and pharynx rough with teeth; 4 gills on each side; 7 branchiostegals. Gill opening reduced to a slit above base of pectorals. Pectorals large, very broad, commencing at the throat, the inferior part of their bases being parallel, ascending to the gill opening, composed of about 30 rays, the inferior very short and not connected by a membrane. Dorsal and anal fins continuous with the caudal, commencing a little behind middle of body, and composed of feeble rays; jugular disk situated between the pectorals in front of the vent, very small, soft, supported by a bilamellated cartilage which descends from the throat; vent between pectorals; caudal small, 6-rayed. Rose-colored; vertical fins violet; gill cavity black. Steller adds the following anatomical details: Ovarium orbicular, containing eggs of the size of a pea. Liver large, divided into 4 lobes, of a whitish color; gall bladder absent; spleen triangular, brown; stomach 3 times as wide as the œsophagus; 48 pyloric appendages, 2 inches long and as thick as the wing feather of a pigeon, in a specimen 18 inches long; remainder of intestinal tract about as long as the fish; urine bladder the size of a hazelnut; kidneys united into one cuneiform mass, commencing near the gills and extending to anterior portion of ovarium; ureter single, very wide, flexous, becoming narrower before its insertion into the bladder. The *nervi optici* and *olfactorii* have one common ganglion, from which, first, the former arise, emitting the latter from the angle formed by the nerves and the ganglion. Skeleton very slightly osseous. Coast of Kamchatka. Specimens (1 of 18 inches long) were found by Steller in Peter and Paul Harbor, Kamchatka. (Pallas.) The species has not been recognized by recent writers. Not seen by us. (*gelatinosus*, jelly-like.)

Cyclopterus gelatinosus, PALLAS, Spicilegia, VII, 19, 1769, Peter and Paul Harbor, Petropaulski Kamchatka. (Coll. Steller.)

Liparis gelatinosus, GÜNTHER, Cat., III, 163, 1861.

Careproctus gelatinosus, JORDAN & GILBERT, Synopsis, 740, 1883; GARMAN, Discoboli, in Memoir M. C. Z., No. 2, XIV, 76, 1892.

Subgenus ALLOCHIR, Jordan & Evermann.

2468. CAREPROCTUS MELANURUS, Gilbert.

Head 4½ to 4⅔ in length; depth 4¼ to 4½. D. about 58; A. 50; P. 30. Head heavy, with vertical cheeks, short bluntly rounded snout, and very broad, flat interorbital space. Width of interorbital space slightly more than ½ length of head. Mouth very broad, horizontal, with short lateral cleft, the maxillary reaching to below middle of eye; width of mouth equaling length of snout and eye. Teeth short and strong, in narrow bands in both jaws; except at symphysis, the teeth of the bands are arranged in regular series running from inner edge of jaw forward and sideward. Tongue and roof of mouth papillose and toothless. Gill rakers tubercular. Nostrils single, in a very short wide tube, which is nearer eye than cleft of mouth. Gill opening oblique, entirely above base of pectorals, the length of slit equaling snout and ½ eye. A series of 6 pores along under side of mandible and interopercle; none on preopercle; 3 above premaxillary, and 2 pairs on snout; no pores along side of body. Sucking disk extremely small, little more than ½ diameter of orbit, its center and the middle of pupil equidistant from tip of snout; disk separated from vent by a trifle less than its own diameter. Pectorals forming a continuous lamella, following the margin of gill flap and lower jaw, the 2 fins becoming closely approximated in front of sucking disk; fin not notched, the rays decreasing regularly forward, 8 to 10 of the anterior rays exserted and elongated, the anterior 4 or 5 becoming again shorter and thicker, and wholly free from the membrane; pectorals scarcely reaching front of anal, ⅔ to ¾ length of head; dorsal beginning over gill slit, the distance from origin of anal to snout, 2½ in length; fins all enveloped in thin lax skin, so that it is impossible to count rays accurately without dissection; posterior dorsal and anal rays well overlapping base of caudal, their membranes joining middle of caudal rays. Color light rose-red on body and fins, abdomen usually dusky; inner face of pectorals, caudal, posterior portions of dorsal and anal, and inside of mouth and gill openings black; peritoneum silvery, with more or less black specking, sometimes nearly black. Several specimens, the longest about 6 inches long, from *Albatross* Stations 2840, 2891, 2892, 2925, and 3076, in depths from 178 to 339 fathoms off the coast of California and Oregon. (Gilbert.) (*μέλας* black; *οὐρά* tail.)

Careproctus melanurus, GILBERT, Proc. U. S. Nat. Mus., 1891, 560, off coast of California and Oregon, at Albatross Stations 2840, 2891, 2892, 2925, and 3076, in 178 to 339 fathoms. (Type in U. S. Nat. Mus.)

Subgenus ALLURUS, Jordan & Evermann.

2469. CAREPROCTUS ECTENES, Gilbert.

Head 5½ in total length, its depth ⅔, and its width ¾ its length. An extremely elongate form, depressed but narrow anteriorly, the head as seen from above appearing shovel-shaped, with truncate snout; nape not elevated and the cheeks not gibbous; width anteriorly everywhere exceeding depth; mouth inferior and transverse, overlapped by the short, depressed snout for a distance equaling diameter of pupil; width of mouth nearly twice distance from symphysis of lower jaw to angle of mouth, the latter reaching vertical from snout to front of pupil. Teeth small, weakly tricuspid, in narrow bands, lower jaw containing 10 series in each half, the upper 11. Eye large, 1¼ in total interorbital width, equaling length of snout, 3⅓ in head. Nostrils with a very short tubular rim. Mucous pores large; texture of head and body firmer than in most deep-sea Liparids. Gill opening reduced to a narrow slit entirely above the pectorals, its width equaling ½ diameter of orbit. Opercle produced into a narrow spinous process, forming, with its membranaceous flap, a quadrate projection over middle slit. Disk small, under the opercles and posterior part of cheeks, round in shape, slightly smaller than eye, its diameter ¼ length of head; vent separated from disk by about ⅔ diameter of disk. Distance from vent to front of anal ½ its distance from tip of snout. Body extremely slender, its depth at middle of total length equaling diameter of eye, at base of caudal equaling ⅔ diameter of pupil. Dorsal beginning slightly behind axil of pectorals; distance from origin of anal to tip of snout ½ its distance from base of caudal; upper lobe of pectoral extending slightly past front of anal, the lower lobe to opposite the vent; rays of lower lobe partly free; dorsal with about 51 rays, pectorals with 29. Color nearly uniform dusky brownish, lighter on snout, belly, and under side of head; mouth, gill cavity and peritoneum white. Length 3 inches. Bering Sea north of Unalaska Island, in deep water. (ἐκτενής, drawn out.)

Careproctus ectenes, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 442, Bering Sea north of Unalaska Island, at Albatross Station 3331, in 350 fathoms.

788. GYRINICHTHYS, Gilbert.

Gyrinichthys, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 444 (*minytremus*).

Teeth simple, not tricuspid. Body attenuate posteriorly, as in *Paraliparis*, the tail scarcely distinct. Disk small, under the posterior part of the head, the vent immediately behind it. Pectorals without anterior lobe, the rays progressively shortened, none of them exserted or with free tips. Gill openings reduced to a minute round pore, well above base of pectorals. One species known. (γυρῖνος, tadpole; ἰχθύς, fish.)

2470. GYRINICHTHYS MINYTREMUS, Gilbert.

Body in the type greatly distended with eggs, the original shape difficult to ascertain, tapering posteriorly into an extremely slender, compressed tail. Head slender, not greatly depressed, the depth and width about equal. Nuchal region not elevated, the profile rising but little behind the snout, which is blunt, with almost vertical profile. Mouth very small, almost entirely transverse at end of snout, with but little lateral cleft, the angle of mouth scarcely reaching vertical from nostril; jaws even, the snout very slightly protruding beyond premaxillaries. Teeth slender, acicular, without cusps, the inner teeth longest; bands of teeth very narrow, with but 5 or 6 oblique series in each half of each jaw; the teeth directed backward, but scarcely depressible. Nostrils without tube. Eye large, 1½ in total interorbital width, equaling length of snout. Gill opening a small pore, scarcely larger than nostril, well separated from upper margin of pectoral. Disk of moderate size, round, its diameter equaling ½ length of head; vent close behind disk, separated from it by ⅙ its distance from front of anal fin. Pectoral small, its upper edge on a level with lower margin of eye, the 2 fins converging under the throat, the anterior rays progressively shortened, all included within the membrane; dorsal without any detached anterior portion, beginning well behind the head, at a distance from gill opening equaling ½ length of head; like the anal, it is continuous with the very narrow caudal fin, there being no notch or evident separation between them; distance from tip of snout to front of anal 1$\frac{2}{3}$ in distance of latter from base of caudal; dorsal with about 45 rays; caudal with a very narrow base, containing, apparently, 14 rays, its length equaling that of snout and eye. Color light brownish, everywhere dusted with minute black specks, which are largest on back and tail; lining of mouth and gill cavity and peritoneum white. Eggs large, visible through the abdominal wall, about 3$\frac{1}{2}$ mm. in diameter. Length 3 inches. Bering Sea, north of Unalaska Island, in 350 fathoms; only the type known. (*μικρός*, reduced; *τρῆμα*, aperture.)

Gyrinichthys minytremus, GILBERT, Rept. U. S. Comm. 1893 (1896), 444, Bering Sea, north of Unalaska Island, at Albatross Station 3331, in 350 fathoms. (Type, No. 48617.)

789. AMITRA, Goode.

Amitra, GOODE, Proc. U. S. Nat. Mus. 1880, 478 (*liparina*).

Monomitra, GOODE, Proc. U. S. Nat. Mus. 1883, 109 (*liparina*); name changed on account of the prior use of the name *Amitrus*.

Body elongate, attenuate backward, covered with lax, smooth, slimy skin, which is separated from the body and fins by a filmy mucous intertissue. Head small, thick, convex between eyes; snout convex, protruding; mouth small, horizontal, the lower jaw included; teeth small; eyes lateral; gill openings restricted to small slits above the base of the pectorals, covered by the very small opercle; pseudobranchiæ present, very small, no barbels; dorsal and anal fins many-rayed; dorsal continuous, almost concealed by the skin, the spines scarcely different from the soft rays; anal similar to dorsal; both connected with the caudal, which is pointed; no trace of ventral fins or sucking disk; pectoral fin very broad, procurrent, its lower rays inserted nearly under the eye, the fin emarginate; vent well behind head. This genus is of very doubtful value, the presence of pseudobranchiæ alone separating it from *Paraliparis.** (*ἀ*, without; *μίτρα*, stomacher.)

2471. AMITRA LIPARINA, Goode.

D. 67; A. 54; pectoral 23; caudal 6. Body elongate, compressed posteriorly, very thin at the tail, covered by a thick, lax, slimy skin. Head small, thick, convex between the eyes, length 4$\frac{1}{3}$ times in width, $\frac{3}{20}$

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*The following words of Professor Putnam, written before the discovery of *Psychrolutes* and *Liparididæ* without ventral disk, are of interest in this connection: "I should put the family of *Gobiesocidæ* far away, at least a suborder off, from the *Cyclopteridæ* and *Liparididæ*, which are far more closely united to the true *Cottidæ*, represented by *Cottus* and *Hemitripterus*, than to either the *Gobiesocidæ* proper or to the Gobies and Blennies. In fact, *Liparis* has as close affinities, as shown by its skeleton, with *Cottus* and *Hemitripterus* as with *Cyclopterus;* and we have in the three groups, represented by *Cottus*, *Liparis*, and *Cyclopterus*, well-marked families of the same suborder. The only character by which the *Cyclopteridæ* and *Liparididæ* are closely united consists in the peculiar formation of the ventral disk by the union of the ventral fins; but as this structure is simply brought about by the modification of the rays in a manner common to the several genera, and not by any marked anatomical difference in the structure of the same fins in *Cottus*, I can only look upon it as a generic character common to the known representatives of both families of *Cyclopteridæ* and *Liparididæ;* and the discovery of a representative of either family with ventral fins of the ordinary form would not necessitate the establishment of a family for its reception, as in that case we should simply consider the structure as of generic value." (Putnam, Proc. Am. Ass. Adv. Sci. 1873, 337.)

of the total length without caudal; snout convex, protruding; mouth under the snout and far back from its tip; eyes lateral, ½ as wide as the interorbital area; nostrils in front of the eye. Operculum very small, strap-shaped. Gills 3½. Pseudobranchiæ present. Teeth weak, paved. Dorsal beginning over end of pectoral, the rays and outline, as of the anal, hardly visible through the skin; anal beginning below eighth to tenth dorsal rays; dorsal and anal rays closely connected with those of caudal, which are larger and extend in a pencil-like point; ventrals absent; pectoral broad, lower base almost below posterior margin of orbit, lowest 6 rays prolonged. The jugular disk can not be found. Color yellowish white, dusky toward the tail and blackish upon the anterior part of the head; abdominal cavity showing black through the skin. Length 5 inches. Atlantic Ocean, off Rhode Island, in 487 fathoms. (Goode.) (*liparina*, like *Liparis*.)

Amitra liparina, GOODE, Proc. U. S. Nat. Mus. 1880, 487, off Rhode Island (Type, No. 26184. Coll. *Fish Hawk*); JORDAN & GILBERT, Synopsis, 739, 1883.

Monomitra liparina, GOODE, Proc. U. S. Nat. Mus. 1883, 109.

Paraliparis liparinus, GÜNTHER, *Challenger*, Report, XXII, Deep-sea Fishes, 68, 1887; GARMAN, Discoboli, 52, 1892; GOODE & BEAN, Oceanic Ichthyology, 278, 1896.

790. PARALIPARIS, Collett.

Paraliparis, COLLETT, Vid. Selsk. Forh. Christiana, 14, 32, 1878 (*bathybii*).

Hilgendorfia, GOODE & BEAN, Oceanic Ichthyology, 280, 1896 (*membranacea*).

Amitrichthys, JORDAN & EVERMANN, Check-List, 453, 1896 (*cephalus*).

This genus differs from *Careproctus* chiefly in the total absence of the ventral disk. The teeth, so far as described, are simple, as in the older individuals of *Careproctus*. Body long, slender in the caudal portion, covered with a loose, thin skin. Vent remote from the anal. Pectorals deeply notched or divided. Dorsal and anal long, and confluent with the caudal. Vertebræ numerous. Gill rakers 3½. Pseudobranchiæ entirely wanting. Deep-sea fishes of the Arctic. The species are all of very recent discovery. They vary considerably among themselves, and are perhaps divisible into 2 or 3 genera. Among such degenerate forms, the characters usually taken as generic lose their value. (*παρά*, near; *Liparis*.)

a. Insertion of pectoral low, its upper ray below the level of the eye.
  PARALIPARIS:
    b. Gill openings rather large, the gill slit extending downward to opposite middle of pectoral; head large, 5 in length; depth 6. D. 60; A. 54; pectoral divided to the base, its lobes wholly separate, its rays 24; lower jaw included. HOLOMELAS, 2472.
  AMITRICHTHYS (α, without; μίτρα, stomacher; ἰχθύς, fish.):
    bb. Gill openings restricted to the region above pectorals.
      c. Head very large, 4½ in length, its depth at occiput 4¾ in length, twice depth of body at front of anal; lower jaw projecting; pectoral rays 14, the fin simply notched. CEPHALUS, 2473.
      cc. Head rather small, 5 to 6¼ in length.
        d. Pectoral fin divided to the base, its lobes separate; lower jaw included; head 5⅔ in length; depth 4¾. ROSACEUS, 2474.

dd. Pectoral fin more or less deeply notched, not divided to base.
  e. Lower jaw projecting. P. 16; D. 57; A. 43; head $5\frac{3}{4}$ in length; depth $5\frac{3}{4}$. MENTO, 2475.
  ee. Lower jaw included.
    f. Pectoral rays 31; head $6\frac{1}{4}$ in length; depth 6. D. 65; A. 55. COPEI, 2476.
    ff. Pectoral rays 30; head 5 in length; depth $6\frac{1}{4}$. D. 56; A. 46. DACTYLOSUS, 2477.

HILGENDORFIA:*
aa. Insertion of pectoral very high, its upper rays above pupil; lower jaw included; pectoral fin notched; gill opening small; head 5; depth 5. D. 65; A. 60; P. 25. ULOCHIR, 2478.

Subgenus PARALIPARIS, Collett.

2472. PARALIPARIS HOLOMELAS, Gilbert.

Head about 5; depth about 6; eye $3\frac{2}{3}$. D. 58 to 61; A. 54. Head very large and heavy, with very broadly rounded snout, and much swollen occipital and nuchal regions, the highest point over upper opercular angle, from which point the profile descends rapidly backward, though much less so than in *P. cephalus.* Snout very blunt, evenly rounded, very slightly projecting beyond the mouth, its width equaling length of snout and eye, $\frac{1}{2}$ length of head; eye $\frac{2}{3}$ interorbital width; mouth large, horizontal, quite at lower side of snout, entirely below the eye; maxillary reaching a vertical slightly behind posterior margin of orbit, $1\frac{7}{8}$ in head; teeth acute, arranged in oblique series in each jaw, forming a very narrow band in mandible, a broader band in upper jaw; very large mucous slits on head, 5 forming a series from tip of snout below eye and across cheek, 6 along mandible and preopercle; gill slit wide, extending from above opercular flap nearly to middle of base of pectorals, its length $2\frac{1}{4}$ in that of head; opercle forming posteriorly a narrow angular flap, projecting above base of pectorals; no pseudobranchiæ; vent below opercular flap, or somewhat in advance of that point, nearer to base of pectorals anteriorly than to first anal ray; pectorals inserted very low, the base of upper lobe vertical, the base of notch and lower lobe horizontal, the upper end of base below the level of the eye; pectorals with 2 wholly distinct lobes, the interspace without free membranaceous margin, the skin of abdomen directly continuous at this point with that of shoulder girdle. On dissecting off the integument, however, the interspace between the lobes is seen to be provided with 2 or 3 short, widely spaced rays, as in all other species examined by us; upper lobe long, reaching beyond front of anal, the rays close set, 18 in number, included in the membranes to their tips; lower lobe consisting of 5 or 6 slender, almost filamentous rays, the longest reaching front of anal, all of them free to the base, without connecting membrane; anterior (lower) ends of shoulder girdle approximate, the rays separated by a distance equaling $\frac{1}{2}$ diameter of pupil; dorsal beginning above base of pectorals. Color uniformly black, including fins and lining of mouth and gill cavity. Closely allied to *P.*

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* Named for Dr. Franz Hilgendorf, ichthyologist of the University of Berlin.

cephalus and *P. mento*, differing in its uniform coloration, its more inferiorly placed horizontal mouth, and the distinctly included lower jaw. Length 4 inches. Bering Sea, north of Unalaska Island, in deep water; only 2 specimens known. (Gilbert.) (ὅλος, entirely; μέλας, black.)

Paraliparis holomelas, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 441, Bering Sea, north of Unalaska Island, at Albatross Stations 3308 and 3332, in 406 and 1,625 fathoms. (Type, No. 48637.)

Subgenus AMITRICHTHYS, Jordan & Evermann.

2473. PARALIPARIS CEPHALUS,* Gilbert.

Head very large, high, and compressed, the upper profile descending in a strong convex curve behind the occiput; body tapering posteriorly to a very narrow thread-like tail. Sides of head vertical or inclining inwards below. Height of head twice height of body opposite origin of anal. Interorbital space transversely rounded, its width slightly less than length of snout and eye. Eye of moderate size, 4 in head, without vertical range. Mouth oblique, the premaxillaries but little below lower margin of eye; lower jaw longer than upper, the tip protruding; maxillary reaching vertical from posterior margin of eye, slightly more than length of head. Gill slits narrow, confined to a region above the base of the pectorals; membrane connecting branchiostegal rays with shoulder girdle very delicate and easily ruptured; vent distant less than a diameter of the orbit from this point, being below the front margin of the preopercle. Teeth in narrow bands in both jaws, the teeth of the bands arranged in oblique series running outward and forward; palate toothless. Head 4½ in length, greatest depth (at occiput) 4⅘. Pectoral small, with about 14 rays, the upper ones closest and forming a projecting lobe, which extends backwards to beyond origin of anal, the succeeding rays shortened and wide set, and with the tips free from the membrane, the fin somewhat mutilated, but apparently notched, not, however, to the base, the median portion having wide-set rays; upper margin of pectorals on a level with tip of lower jaw; dorsal beginning slightly behind head; first ray of anal under eighth of dorsal. Color light reddish, the abdomen blue black; inside of mouth and gill opening white. In the smallest specimens, 2 inches long, the color is dusky on head and body, and on inside of mouth. Longest specimen 3½ inches. This species differs from *Paraliparis* (*Hilgendorfia*) *membranaceus* in the structure of the pectoral fins and their much fewer rays, in the position of the vent (below the posterior margin of the orbit in *membranaceus*), the different outline of head, and in the larger, more oblique mouth. In none of the specimens of *cephalus* are there fin folds extending forward from front of dorsal and anal, as described in *membranaceus*. Alaska to California, in deep water;

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* Dr. Gilbert later records several more or less mutilated specimens afterwards taken north of Unalaska Island, and near Point Reyes, California, in depths of 351 and 455 fathoms. In this species the pectoral is inserted very low, its upper edge entirely below the eye. The lower jaw shuts within the upper, but the symphysis protrudes. The disproportion in size of head and body is more exaggerated in the young than in adults. In very small examples the head is almost spherical, diminishing abruptly to the very slender tail. No pseudobranchiæ. (Gilbert.)

several specimens in 284 to 685 fathoms off the coast of California and Oregon. and north of Unalaska. (*κεφαλή*, head.)

Paraliparis cephalus, GILBERT. Proc. U. S. Nat. Mus. 1891. 561, off California and Oregon, at Albatross Stations 2839, 2892, 3070, and 3071, in 284 to 685 fathoms.

2474. PARALIPARIS ROSACEUS, Gilbert.

Head small, 5⅔; depth 4¾. D. 58; A. 53. Body slender, covered with lax skin, which invests also the fins; mouth transverse, nearly horizontal, the maxillary scarcely vertical from front of pupil, equaling length of snout, 3¼ in head; eye ½ interorbital width, 5 in head. Teeth in lower jaw pointed, in a single close-set series, their even tips forming an almost uniform cutting edge; teeth in upper jaw apparently paved. the jaw presenting a smooth, rounded surface, on which the teeth are little evident, but occasionally presenting sharp. projecting points; lower jaw included. A series of conspicuous mucous pores on snout, mandible, and on preopercle. Gill opening a narrow slit above base of pectorals. Pectoral fin divided into 2 wholly distinct lobes not connected by intervening rays, a space without rays present. equaling diameter of pupil; lower lobe of 4 rays. the longest ⅗ head, inserted under preopercular margin; main portion of the fin with about 15 rays and but slightly longer than the lower lobe; dorsal beginning behind middle of pectorals, its distance from tip of snout 4⅙ in length; distance of origin of anal from tip of snout equaling ⅓ standard length; vent under base of upper pectoral rays, but wholly behind base of lower lobe of pectorals, its distance from tip of snout equaling length of head and equaling also its distance from origin of anal; no trace of ventral disk or fins. Color light rose-red, the fins and head largely jet black; abdomen behind vent blackish; peritoneum and lining membranes of mouth and gill cavity jet-black. Length 5⅓ inches. Off coast of Southern California. (*rosaceus*, rosy.)

Paraliparis rosaceus, GILBERT, Proc. U. S. Nat. Mus. 1890, 93, off coast of California at Albatross Station, 2919, 984 fathoms; GARMAN, Discoboli, 80, 1892.

2475. PARALIPARIS MENTO, Gilbert.

Head 5¾ in length without caudal, equaling the greatest depth. D. 57; A. 43; pectoral 16. Eye a trifle less than interorbital width. greater than snout. 3 in head; mouth oblique, with lateral cleft, the maxillary reaching slightly beyond the middle of the orbit, ½ as long as the head; chin very prominent, the mandible with a wide, membranaceous border, which forms anteriorly a broad free fold over anterior portion of base of pectorals. Teeth in both jaws comparatively long and slender. not tricuspid, arranged in bands, those in upper jaw at least in oblique rows as usual in Liparids. Nostril with a single opening and without tube. Gill opening but little wider than diameter of eye, confined to region above base of pectorals. Pectorals inserted very low, their upper rays below level of angle of mouth, the base almost horizontal, and the anterior ends of shoulder girdle form prominent projections below tips of mandibles, fin very deeply notched, the upper lobe extending slightly beyond origin of anal, the shortest middle ray about ¼ that length; a few of the lower rays elongate and partly free from the membrane, the longest equaling the length of the upper lobe; middle pectoral rays wide set, but no rayless interval between the lobes; pectorals converging to immedidiately behind symphysis of lower jaw, where their bases meet; anal opening vertically below middle of orbit; dorsal beginning a trifle behind the upper angle of gill opening, the anal origin under its eighth ray. Skin loosely investing the head and body. Light reddish, made dusky by minute dark dots; abdomen blue black; mouth and gill cavity light or dusky. Closely allied to *Paraliparis (Hilgendorfia) membranaceus* (Günther), but with very heavy lower jaw, which projects beyond the upper. The premaxillaries are high, on the level of the lower rim of the orbit, and the form is much more elongate. The pectorals are inserted much lower, and the vent is farther forward. Length 3¼ inches. Off the coast of Oregon in deep water. (Gilbert.) (*mento*, having a projecting chin.)

Paraliparis mento, GILBERT, Proc. U. S. Nat. Mus. 1891, 562, off Coast of Oregon at Albatross Station 3071, in 685 fathoms.

2476. PARALIPARIS COPEI, Goode & Bean.

Head 6¼; depth about 6; snout 3½; eye 3½. D. 60; A. 55; pectoral 17 + 3; caudal 10. Snout broad, obtuse; interorbital width equaling length of posterior part of head; nostril about midway between eye and tip of snout, in a very short tube. Five large mucous pores on each side of snout, 3 smaller ones on cheek under eye, and 6 on mandible and edge of opercular bones. Teeth minute, villiform, and in 2 series. Gill opening a very small slit, edged with black at upper angle of pectoral. Origin of dorsal distant from snout 1½ times length of head; tip of pectoral when extended about under second or third ray of dorsal; anal origin under ninth or tenth dorsal ray; length of middle caudal ray 10½ times in standard length; longest pectoral ray equaling ½ distance from snout to dorsal; longest ray of the isolated portion of the fin equaling that of middle caudal ray; distance of vent from tip of snout nearly equal to length of head; vent a narrow slit placed horizontally, directly under base of pectoral. Pyloric cæca 4 to 6. Color, anterior half of body very pale, whitish; posterior half very light brown; snout, chin, and edge of gill opening and region about the vent black. This species has nearly the same number of rays in the dorsal and anal as are recorded for *P. bathybius*, but the pectoral has 17 rays in the upper portion and 3 in the lower. The jaws are shorter than in *P. bathybius;* the form is more elongate and the coloration is strikingly different, anterior half of the body pale, almost whitish, while the snout, chin, and anal origin are black. Length about 8 inches. The eggs of an example a little smaller than the type have a diameter of about 3 mm. At the same time the ovaries contain some eggs, which have not reached maturity, whose diameter is only ½ mm. The stomach is a stout subspherical receptacle, its greatest width ⅝ of its length. Gulf Stream, in deep water. (Named for Prof. Edward Drinker Cope.)

Paraliparis copei, GOODE & BEAN, Oceanic Ichthyology, 279, fig. 253, 1896, Gulf Stream, at Albatross Station 2232, in 39° 12′ 17″ N., 72° 9′ 30″ W., in 520 fathoms. (Type, No. 35637.)

2477. PARALIPARIS DACTYLOSUS, Gilbert.

Head 5; depth 6¼. D. about 56; A. about 46. Shape of head much the same as in *P. ulochir*. the snout broadly rounder, slightly, if at all, overlapping the horizontal mouth, and the cheeks vertical. Occiput and nape not conspicuously swollen. Lower jaw included; maxillary reaching vertical behind middle of pupil, 2⅔ in head. Eye large, 3 in head; bony interorbital space 5; snout 4½. Gill opening a narrow slit extending to opposite third or fourth pectoral ray, its length equaling diameter of pupil. Teeth acute, in narrow bands in each jaw, each band made up of oblique rows. Opercle produced into a pointed lobe, which is separated from upper pectoral ray by a distance equaling diameter of pupil. Dorsal beginning slightly behind upper base of pectorals; pectorals inserted lower than in *P. ulochir*, the upper ray on a level with or below margin of pupil; as in *P. ulochir*, the 2 lobes joined by a series of about 8 more widely spaced rays, none of the rays is free; anterior ends of the fins meeting under throat at a point vertically below the pupil; pectoral rays 30, of which about 10 constitute the lower lobe; upper rays extending beyond front of anal, but the lower lobe apparently much shorter. Vent anterior in position, its distance from pectoral symphysis ½ its distance from front of anal. Each of the types has lost the epidermis. In this condition the head and body are light or slightly dusky, except the eyes, opercles, gill membranes, and abdomen, which are black; gill cavity and mouth black; probably black everywhere in life. Very close to *P. ulochir*, but with the upper insertion of pectoral much lower, opposite the lower margin of pupil, and the head and body much more slender and elongate. Length about 3¼ inches. Off Santa Cruz, California, in deep water. (*dactylosus*, *δάκτυλος*, fingered.)

Paraliparis dactylosus, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 469, pl. 34, fig. 2, off Santa Cruz, California, at Albatross Station 3112, in 296 fathoms.

Subgenus HILGENDORFIA,[*] Goode & Bean.

2478. PARALIPARIS ULOCHIR, Gilbert.

Head about 5 in length, equaling the depth. D. about 65; A. about 60. Snout broad and short, very slightly projecting beyond the mouth, the distance from tip of snout to front of eye 4½ in length of head. Eye large, 3 to 3¼ in head, nearly twice the bony interorbital width. Differing from other Pacific species in the high insertion of the pectorals and their short horizontal limb, and from *P. holomelas* in having the fins not divided into 2 separate lobes. In general appearance greatly resembling *P. holomelas*, being also uniformly black in color, having the same broadly rounded snout, horizontal mouth with included lower jaw, and prominent occipital and nuchal region. The maxillary reaches vertical just behind pupil and is contained 2⅒ times in head. Teeth acute, in rather broad bands in both jaws. Gill opening a narrow slit, restricted to area above base of pectoral, not longer than diameter of pupil. Opercle forming a short, pointed lobe posteriorly, which touches base of upper pectoral ray. The head is denuded of skin, so the nature of the mucous pores can not be made out. Dorsal beginning above upper base of pectorals; pectoral placed higher than in any other species known, its base describing a gentle, even curve, convex backward, horizontal for a very short distance anteriorly, its upper end above level of pupil, and its lower anterior end vertically below posterior margin of orbit; upper and lower rays of the fin fine and crowded, the middle third of the base being occupied by 4 or 5 more widely spaced rays; the fin with 25 rays, of which 9 belong to the lower lobe; upper lobe extending beyond origin of anal fin; none of the rays free; lower anterior ends of pectorals closely approximated, without perceptible interspace. Vent anterior in position, a distinct, though short, anal papilla. Distance from vent to anterior end of pectoral base ⅓ its distance from front of anal. Longest specimen 85 mm. Uniformly black, including mouth and branchial cavity. Gulf of California and Bering Sea north of Unalaska Island, in deep water. (*οὐλός*, complete; *χείρ*, hand.)

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[*] The subgenus *Hilgendorfia*, Goode & Bean, is thus defined: "Liparids with large, high, compressed head, whose bones are exceedingly thin, cavernous jaws, even in front. Vertical fins represented by broad median folds, confluent at the posterior end of the body, where the caudal is represented by 2 or 3 exceedingly fine, slender, terminal filaments. Pectoral very large, broad based, with membranes fringed posteriorly and having several of the lower rays free, though not forming a distinct portion of the fin. No ventral disk. Vent far advanced, opposite hind margin of orbit. Gill opening as in *Amitra*. The type described by Günther is only 60 mm. in length, and he remarks concerning it that it is uncertain whether it represents a form in which embryonic characters are persistent, or merely an early stage of development. Its peculiarities seem sufficient to warrant its being set apart for further study before it is merged with *Paraliparis*. It is named for Dr. Franz Hilgendorf, of the Royal Zoological Museum, Berlin." (Oceanic Ichthyology, 280, 1896.)

Paraliparis ulochir, Gilbert, Rept. U. S. Fish. Comm. 1893(1896), 441, Gulf of California, at Albatross Station 3010, in 1,005 fathoms.

791. RHINOLIPARIS, Gilbert.

Rhinoliparis, Gilbert, Rept. U. S. Fish Comm. 1893 (1896), 445 (*barbulifer*).

Allied to *Paraliparis*, from which it differs in the gently produced snout, which much overlaps the mouth, and bears at its tip a pair of barbels. No sucking disk. Vent anterior, between the pectoral fins; pectorals deeply notched, continuous; gill openings narrow, mostly above the pectorals. Teeth acute, in a broad band in each jaw, arranged in oblique series within the band. Deep sea. (*ῥίν*, snout; *Liparis*.)

2479. RHINOLIPARIS BARBULIFER, Gilbert.

Head 5¾; depth 7; eye nearly 3. Slender, compressed, the greatest depth just in front of dorsal, the nuchal region not greatly swollen. Body tapering into an extremely slender, almost filamentous, tail. Mouth small, horizontal, inferior, overpassed by the broadly rounded, very soft snout for a distance equaling diameter of pupil. At the tip of the snout, separated by a space ½ as wide as pupil, are 2 barbels directed forward, each as long as the interspace. Maxillary reaching vertical from posterior border of orbit, 2¼ in head; bony portion of interorbital width narrow, ¾ diameter of pupil; gill slit narrow, beginning opposite upper pectoral rays, ⅔ diameter of orbit; no pseudobranchiæ; opercle prolonged posteriorly into a narrow pointed flap; round mucous pores along under side of snout and suborbital, and on under side of mandible. Pectorals of 2 lobes, the lower narrow, containing but 4 or 5 rays, the upper with about 15, 1 or 2 rays widely spaced connecting the 2, none of the rays free, the fin inserted high, the upper end of base on a level with upper edge of pupil; below, the fins are not approximated as closely as usual, the lowermost rays of the 2 fins separated by an interspace as wide as pupil, inserted on a vertical through middle of cheek; dorsal originating slightly in front of gill slit. Vent anterior in position, its distance from front of pectorals ⅖ its distance from front of anal fin. In spirits, light gray, dusky along bases of dorsal and anal fins and on the nape; the black lining of abdominal cavity, gill cavity, and mouth can be seen through the transparent integuments; eye also black; barbels transparent, hence very inconspicuous. Length about 3½ inches. Bering Sea, north of Unalaska Island, in deep water. (*barbula*, a small barbel; *fero*, I bear.)

Rhinoliparis barbulifer, GILBERT, Rept. U. S. Fish Comm. 1893 (1896), 445, Bering Sea, north of Unalaska Island, at Albatross Stations 3227, 3325, 3326, and others, in 225 to 576 fathoms.

Suborder CRANIOMI.

Scapular arch abnormal, the post-temporal forming an integral part of the cranium and the postero-temporal crowded out of place by the side of the proscapula above or at the edge of the post-temporal. In other respects essentially as in the *Loricati*, from which the *Craniomi* are derived. The suborbital stay characteristic of both groups, in the *Craniomi* is highly developed, its surface forming part of the bony armature of the head. Fishes mostly of the warm seas, often singular in form, the head always with a coat of mail. (*κράνιον*, skull; *ὦμος*, shoulder.)

a. Myodome* developed and cranial cavity open in front; prosethmoid and anteal normally connected by suture. Infraorbital chain with its anterior bones excluded from the orbit and functional as rostrolateral, the series covering the cheeks, the third a large buccal bone articulating with the anterior wall of the preoperculum; post-temporal suturally connected with the opiotic and pterotic by inferior processes, and with the upper surface forming an integral part of the cranium; intermaxillaries with the ascending pedicles atrophied and connected with the knob of the anteal by ligament. Postero-temporal contiguous to the proscapula; ventral rays I, 5; the fins inserted wide apart; gill membranes free from the isthmus.

  b. Pectoral fin with its 3 lowermost rays detached as feelers; teeth present. TRIGLIDÆ, CLXXXIV.

  bb. Pectoral fin with its 2 lowermost rays detached as feelers; mouth toothless. PERISTEDIIDÆ, CLXXXV.

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* The skeletal characters here given are taken from Dr. Gill. (Proc. U. S. Nat. Mus. 1888, 567-592.)

aa. Myodome undeveloped, the cranial cavity mostly closed in front by expansions from the subtectals suturally connected with corresponding expansions of the prootics and the parasphenoid; prosethmoid and anteal entirely disconnected, leaving a capacious rostral chamber opening backward mesially into the interorbital region. Infraorbital chain with its second and third bones crowded out of the orbital margin by junction of the first and fourth, and leaving a wide interval between the suborbitals and preoperculum; the first very long and extending backward, the second under the fourth, and the third developed as a small special bone (pontinal) bridging the interval between the second suborbital and the antero-inferior angle of the preoperculum; post-temporal suturally connected with the posterior bones of the cranium, and with the upper surface forming a large part of the roof of the head; intermaxillaries with well-developed ascending pedicles gliding into the cavity between the anteal and prosethmoid. Postero-temporal distant from the proscapula, and manifest as an ossicle on the edge of the post-temporal.

  c. Pectoral fin divided to the base into 2 unequal parts; no free feelers; gill membranes broadly joined to the isthmus; ventral rays I, 4, the fins contiguous. CEPHALACANTHIDÆ, CLXXXVI.

Family CLXXXIV. TRIGLIDÆ.

(THE GURNARDS.)

Body elongate, usually more or less fusiform, covered with scales or bony plates. Head externally bony, entirely cuirassed with rough, bony plates, some of which are armed with spines; eyes high; mouth terminal or subinferior; premaxillaries protractile; maxillary without supplemental bone, slipping under the preorbital; teeth very small, in bands in the jaws, and usually on vomer and palatines; gills 4, a large slit behind the fourth; pseudobranchiæ present; gill rakers various; gill membranes free from the isthmus. Ventral fins thoracic, wide apart, separated by a flat area, their rays I, 5. Spinous dorsal present, short; soft dorsal similar to the anal, which is without spines; caudal narrow, few-rayed; pectoral large, with broad base, with 3 lower rays detached, forming feelers. These free rays are used chiefly in search for food, turning over stones, exploring shells, etc.* Air bladder present; pyloric cæca usually present, few in number. Singular looking fishes, found in all warm seas. Genera 5; species about 40, some of them in rather deep water, these red in color, the others living about rocks. (*Triglidæ*, pt., Günther, Cat., II, 191–210.)

a. Palatines with teeth.
  b. Dorsal spines low, the longest usually much shorter than head; scales moderate, 50 to 80 pores. PRIONOTUS, 792.
  bb. One or 2 of the dorsal spines greatly elevated, about as long as body; scales large, rough, the pores 40. BELLATOR, 793.
aa. Palatines toothless; scales small.
  c. Lateral line without enlarged bony plates. CHELIDONICHTHYS, 794.
  cc. Lateral line armed with a series of transverse bony plates. TRIGLA, 795

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* See note by Albro D. Morrill, Journ. Morphology, XI, 1895, 177.

792. PRIONOTUS,[*] Lacépède.

(Gurnards.)

Prionotus, Lacépède, Hist. Nat. Poiss., iii, 37, 1802 (*evolans*).
Ornichthys, Swainson, Nat. Hist. Class'n Fishes, ii, 262, 1839 (*punctatus*).
Chriolax, Jordan & Gilbert, Proc. U. S. Nat. Mus. 1878, 374 (*evolans*).
Gurnardus, Jordan & Evermann, new subgenus (*gymnostethus*).
Merulinus, Jordan & Evermann, new subgenus (*carolinus*).

Body subfusiform; profile of head descending to the broad depressed snout, which is much longer than the small eye; eyes close together, high up; surface of head entirely bony, the bones rough with ridges and granulations; scales on head few or none; preopercle with 1 or 2 sharp spines at its angle; opercle with a sharp spine; nape with 2 strong spines; a spine on shoulder girdle. Mouth rather broad; bands of small, almost granular, teeth on jaws, vomer and palatines; gill membranes nearly separate, free from isthmus; gill rakers rather long. Body covered with small, rough scales, which are not keeled; lateral line continuous; scales on breast very small. Dorsal fins distinct, the first of 8 to 10 rather stout spines, the third usually highest, but mostly shorter than head; anal fin similar to soft dorsal; pectoral fin with the 3 lower anterior rays thickened, entirely free from each other and from the fin; ventrals I, 5, wide apart, with a flat space between them, the inner rays longest. Pyloric cæca in moderate number; air bladder generally with lateral muscles and divided into 2 lateral parts; vertebræ 10 or 11+15. Species numerous, all but 1 being American.[†] Representing in America the Old World genus *Trigla*. Some of them in deep water. They are well defined and easily recognized, but vary considerably with age, and are not easily thrown into subordinate groups. Most of the characters in the following analysis have been taken from adult individuals. Young examples in most cases differ from the adults in the following respects, in addition to those characters which usually distinguish young fishes: The spines on the head are sharper, more conspicuous, and more compressed in the young, and some spines, especially those on the side of the head, disappear entirely with age. The interorbital space is more concave in the young. The pectoral fins are also much shorter. The gill rakers are longer in the young, and proportionately more slender, and some of the color markings—especially the darker cross shades—are more conspicuous, while the spots on body and fins are less so. (*πρίων*, saw; *νῶτος*, back; 3 free saw-like spines being said to intervene between the two dorsals.)

a. Mouth comparatively small, the maxillary less than ½ the length of the head, the mandible usually not extending backward as far as the vertical from the front of the eye; generally a more or less distinct cross groove on top of head behind eye; black spot on spinous dorsal usually more or less distinct.

Gurnardus (from Gurnard):

- *b*. Snout distinctly birostrate, its tip deeply emarginate; anterior profile of head strongly concave; pectoral fin very short, little if any longer than head; interorbital space deeply concave.

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[*] For a detailed account of the species of *Prionotus* see Jordan & Hughes, Proc. U. S. Nat. Mus. 1886, 327, *et seq.*

[†] The single species found outside our limits is *Prionotus japonicus*, Bleeker.

c. Preopercular spine with a smaller one at base in front.

d. Center of radiation of cheek with a strong spine, there being 4 spines in a right line from rostral plate to preopercular spine; rostral projections very narrow; body slender; scales small; 3 dorsal spines granulate. BIROSTRATUS, 2480.

dd. Center of radiation of cheek without spine; 1 or 2 spinules below preopercular spine.

e. Breast and belly wholly naked; dorsal spines 10 or 11. GYMNOSTETHUS, 2481.

ee. Breast and belly with small scales; dorsal spines 8 or 9. XENISMA, 2482.

cc. Preopercular spine with no smaller one at base in front; dorsal spines 10; pores 50; body with olive vermiculations and oblique brown bars. LOXIAS, 2483.

MERULINUS (*Merula*, a robin):

bb. Snout not distinctly birostrate, the anterior profile usually not strongly concave.

f. Pectoral fin long, reaching past front of anal.

g. Pectoral fin not reaching base of caudal; gill rakers moderate, 8 or 10 developed; snout not strongly emarginate; no spine on cheek bone or edge of snout; dorsal spines 10.

h. Body not very slender, the depth 5 in length; head not very small, its length 3 in body; groove across top of head behind eye, very conspicuous; interorbital area moderately concave, rather broad, about equal to diameter of eye; bones of head comparatively smooth, the preocular, postocular, occipital, and nuchal spines low, depressed; temporal ridge conspicuous, without spines. Dorsal spines low, the second 2⅛ in head, the first moderately serrate; base of soft dorsal equal to distance from tip of snout to tip of humeral spine; caudal fin lunate, its outer.rays ⅛ to ¼ longer than inner; pectoral fin somewhat rounded, the longest ray about the fifth; free rays of pectoral expanded toward tip, with decurrent membrane; scales rather large; about 58 pores. Body and fins nearly plain, mottled with darker, but without well-defined spots except the dorsal ocellus; back with 4 obscure cross blotches; 2 or 3 oblique pale streaks across spinous dorsal. Gill membranes dusky. Young with head rougher, pectoral fins shorter, dark spots on body more distinct. CAROLINUS, 2484.

hh. Body very slender, the depth about 6 in length; groove across top of head behind eye, conspicuous; interorbital area narrow, deeply concave, its width about ⅔ the diameter of the eye; bones of head very smooth, the striations very weak; spines on top of head (preocular, supraocular, occipital, and nuchal) short and sharp, not depressed; temporal ridge blunt, without spine.

i. Pectoral short, reaching little past front of anal, not ⅛ length of body. Dorsal spines very high, the second 1¾ in head, the first moderately serrate; soft dorsal high, its base about ¼ longer than head; caudal truncate; free rays of pectoral a little expanded at tip; 52 pores. Body covered with roundish bronze spots of various sizes; smaller bronze spots on the head; both dorsals, caudal, and pectoral fins with similar bronze spots, these especially numerous and distinct on soft dorsal. SCITULUS, 2485.

ii. Pectoral longer, reaching past middle of anal, more than ½ body; pores 62; color rose-red, not spotted; pectorals dusky. ROSEUS, 2486.

gg. Pectoral fins very long, reaching base of caudal, the rays graduated; 50 pores in the lateral line; gill rakers shortish, 1+6 in number; body rather stout, the depth 4 in length; palatine teeth few, feeble; caudal subtruncate; second dorsal spine longest, ½ the length of head; first spine strongly serrated in front; preopercular spine with a smaller one at its base; head 2½ in length. D. X–12; A. 11. Body with 4 faint cross bands; caudal with black tip and 2 paler cross shades; spinous dorsal with small dark spots besides the large one; soft dorsal plain; pectorals clouded. ALATUS, 2487.

PRIONOTUS:

aa. Mouth comparatively large, the maxillary 2 to 2¾ in the length of head, the mandible extending backward to opposite eye, or nearly so; usually no distinct cross groove on top of head; free rays of pectoral tapering, not expanded at tip; black blotch on spinous dorsal diffuse, not ocellated, involving the membranes of more than two spines.

j Preopercular spine without a distinct smaller spine at its base in front.

k. Pectoral fins very long, reaching at least to beyond the second third of the soft dorsal.

l. Scales rather small, about 75 pores in lateral line; head large, comparatively smooth, the interorbital area narrow, concave, not ⅔ diameter of eye; orbital rim low, scarcely serrate; preorbital serrulate; pectoral fin long, reaching middle of anal; coloration plain, slightly clouded; form rather slender; head 2⅘; depth 4½. D. X–12; A. 11. MILES, 2488.

ll. Scales moderate, 50 to 55 pores in lateral line.

m. Head large, nearly plane above, the interorbital space scarcely concave, its width equal to eye; snout very short, 2½ in head; maxillary 2⅙ in head, reaching past front of orbit; bands of palatine teeth very narrow; bones of head smoothish, little striate; gill rakers rather long, about 10 below angle; first dorsal spine slightly rough in front, the third spine nearly ½ the length of the head; caudal slightly concave; pectoral reaching ninth anal ray, its outline rounded; scales about 55. Color pale olivaceous, back and sides with a few dark spots; second dorsal with 3 rows of black spots; caudal with 3 rows of dark blotches; pectorals with round dark blotches. D. X–12; A. 11. STEPHANOPHRYS, 2489.

mm. Head not plane above, the interorbital space more or less concave; dorsal spines 10.

n. Supraorbital cirrus wanting.

o. Pectoral fins moderate, not reaching in adult beyond dorsal and anal.

p. Interorbital space moderately concave, its width nearly equal to eye; orbital rim little elevated; preorbital with 15 to 20 fine serræ, the last one directed backward; preopercular spine long. QUIESCENS, 2490.

pp. Interorbital space very narrow, deeply concave, its width about ⅔ length of eye; rim elevated and serrate; preorbital with about 20 small serræ, blunt and even; head well armed; snout and jaws white. ALBIROSTRIS, 2491.

oo. Pectorals very long, reaching in adult beyond base of dorsal and anal; interorbital space moderately concave, its width about ⅘ length of eye; no cirrus above the eye; distance from supraocular spine to nuchal scales about equal to eye; supraocular and nuchal spines low; occipital spines wanting; temporal ridge sharp, ending in a blunt spine; preorbital projecting, strongly serrate; a blunt spine on each side of snout, behind serræ of preorbital; a blunt spine behind this above angle of mouth; no spine on cheek bone in adult; upper opercular spine almost obsolete; bones of head rather strongly striate, but not granulate; gill rakers short; mouth moderate; scales rather large; about 52 pores. D. X–11; A. 10. First dorsal spine not much shorter than second, which is 2⅕ in head; caudal very slightly concave; ventrals reaching a little past vent; head 3; depth 5. Color nearly plain brownish, with darker clouds; no distinct spots anywhere on body or fins; the pectorals marbled with paler. RUBIO, 2492.

nn. Supraorbital cirrus present, fringed. Interorbital space very deeply concave, its width about ⅗ length of eye; a fringed cirrus above the eye; distance from supraocular spine to nuchal scales about ½ the eye; occipital as well as nuchal spines distinct; temporal ridge with a small spine; no spine on cheek bone; bones of the head with fine, sharply defined striæ, but no granulations; upper opercular spine well developed;

scales moderate (about 50 pores). D. VIII-13; A. 11. First dorsal spine longest, 1½ in head; caudal subtruncate; pectorals nearly twice as long as head, reaching nearly to last rays of dorsal; ventrals about reaching to vent; head 3 in length; depth 4½. Color crimson red, nearly plain; caudal with 2 dark cross shades. OPHRYAS, 2493.

kk. Pectoral fins short, not reaching beyond middle of dorsal; head much smoother than in any other species, the bones of the head faintly striate, with small granulations; the cranial spines little developed; the supraocular, occipital, and temporal spines wholly wanting, there being only 3 pairs of spines on the head; mouth large, the maxillary 2 in head. Gill rakers short and thick in adult, slender in young, about 10 developed; interorbital space concave, rather broad, its width, in adult, rather more than length of eye; first dorsal spine granulated; caudal slightly lunate; pectoral subtruncate, the second ray the longest, as long as head in adult; scales large, 48 pores in the lateral line. Head large, 2⅔ in length; depth 3⅔. D. X–12; A. 11. Color crimson, with darker clouds and small spots; both dorsals with dark cross streaks; head and pectoral fins conspicuously reticulated with blackish (in adult); anal plain, whitish; free rays of pectoral unspotted. STEARNSI, 2494.

jj. Preopercular spine with a distinct smaller one at the base; gill rakers slender.

q. Cheek bone without distinct spine at the center of radiation; edge of preorbital granular-serrate, without distinct spine, the serræ about 12 in number on each side; temporal ridges roughish but without spines; bones of the head with the striæ coarsely granular; mouth moderate, the maxillary about 2⅗ in head; head not very broad, the spines above, except the nuchal spines, not conspicuous; gill rakers long and slender, 15 to 20 developed; head 2¾ in length; depth about 4. D. X–12; A. 11. Coloration brownish; side with a very distinct dusky bronze band below the lateral line and parallel with it, this becoming broken posteriorly into a series of roundish dark spots; some dark streaks and clouds below this stripe; fins with dark clouds, the soft dorsal with 2 dark blotches, which extend as bars on the back; head with scattered dark spots; dusky area below eye.

r. Pectoral with its rays each crossed by fine black bars, these especially distinct toward the base of the fin; free rays spotted; scales comparatively small, 10+1+23 in a vertical line from last dorsal spine to vent; interorbital area broad and almost flat, its width a little more than length of eye; first dorsal spine granulated; second spine 2¾ in head; pectorals about ½ the length of the body. STRIGATUS, 2495.

rr. Pectoral fin with its rays all plain blackish; free rays plain dusky; scales larger, 8+1+21 in a vertical line from last dorsal spine to vent; interorbital space more deeply concave, its width in adult not quite length of eye; first dorsal spine nearly smooth; second spine 3 in head; pectorals a little more than ½ of the body. EVOLANS, 2496.

qq. Cheek bone with a spine (small in the adult, larger in the young) at the center of radiation, this rarely obsolete in old examples.

s. Spines on bones of head moderate, not knife-like; preorbital with a series of serræ and 1 or more bluntish spines.

t. First 3 dorsal spines little if at all serrate; pectorals reaching past middle of anal, their length not quite ½ the body; gill rakers rather long and slender, about 10 developed; maxillary 2⅔ in head; a bluntish spine on edge of snout behind the serræ; behind this, 1 or 2 smaller ones, at least in the young; usually a small spine on cheek bone; a shallow groove behind the eye evident; interorbital area rather narrow, concave; preocular, supraocular, occipital and nuchal spines rather prominent. Dorsal spines high, the third 2⅓ in head;

first spine not serrate; caudal truncate. Head $2\frac{4}{5}$ in length; depth $2\frac{4}{5}$. D. X–12; A. 12. Pores about 50. Back obscurely spotted; dorsal and caudal fins spotted with brown, the first dorsal with a black blotch besides; the pectoral with obscure dark spots, and margined with blue. PUNCTATUS, 2497.

tt. First 3 dorsal spines more or less serrate; gill rakers rather long, about 8 developed; maxillary about $2\frac{2}{3}$ in head; a groove behind eye; interorbital space narrow, $\frac{2}{3}$ eye; third dorsal spine high, $\frac{1}{2}$ head. D. X–12; A. 11. Pores 50. Color brownish yellow; spinous dorsal with a black blotch; pectoral with 2 longitudinal broad dark areas separated and surrounded by paler. BEANII, 2498.

ss. Spines on bones of head elevated, knife-like; head very large, more than $\frac{2}{5}$ length; temporal ridge with 2 bluntish spines; bones of the head very sharply striate; young with 4 sharp, knife-like spines on side of cheek and snout, in a line before the preocular spine, these nearly disappearing with age; maxillary about $2\frac{1}{3}$ in head; sides without dark longitudinal stripe.

u. Pectoral fin moderate, about $\frac{1}{2}$ body in adult, $2\frac{1}{2}$ in young; gill rakers slender in the young, becoming shorter and thicker with age, about 10 developed on lower part of arch; head broad, the spines on its upper surface very prominent, all of them more or less compressed and knife-like, especially in the young. Second dorsal spine $2\frac{1}{2}$ in head; head $2\frac{1}{3}$; depth $4\frac{1}{3}$. D. X–12; A. 11. Body brownish, much mottled with grayish and dusky, and with 3 or 4 obscure dark cross bands; head and dorsal fins with many dark spots; caudal with 2 dusky shades; free rays of pectoral spotted. TRIBULUS, 2499.

uu. Pectoral fin short, about 3 in body; gill rakers long and slender, 5 developed; scales small, 100; spines as in *P. tribulus*, but still larger and more knife-like, much larger than in any other species; pectoral fins reaching third anal ray; interorbital space broad, little concave, about as wide as eye. Body brownish; no black blotch on spinous dorsal; soft dorsal and caudal barred, pectoral with a broad black band. HORRENS, 2500.

Subgenus GURNARDUS, Jordan & Evermann.

2480. PRIONOTUS BIROSTRATUS, Richardson.

Head 3; depth 5. D. IX–12; A. I, 10; C. 10. Body slender and elongate; width at nape between costal spines $5\frac{1}{2}$ in head; head long, profile before eyes concave, the snout with a projecting lobe on each side, the lobe longer and narrower than in any other species, its length $\frac{2}{3}$ eye; a backward projecting spine at base, besides numerous retrorse serræ along its sides; surface of bones very rough; mouth small; maxillary barely $\frac{1}{3}$ head, not reaching front of eye; eye $4\frac{1}{2}$ in head; interorbital space very narrow, deeply concave, granular, striate, its length $\frac{3}{5}$ eye, 7 in head; orbital rim elevated, with a stout spine anteriorly, before which are 3 or 4 others forming a raised ridge; a stout spine above posterior part of orbit, another behind orbit; still another on the occipital beyond ridge; 2 or 3 blunt spines behind eye; a stout spine on opercle which reaches slightly beyond base of the still larger humeral spine; a stout spine on preopercle with another strong spine at its base; another before it on radiation center of cheek; another on the preorbital, these 4 forming a straight line with retrorsal projection and all of them hooked backward; no curve across top of head; membranaceous flap of opercle not scaly; gill rakers unknown; scales rather small, the number not to be counted, apparently none on breast, the naked skin of breast forming an acute angle behind; 7 rows of scales between occiput and dorsal; spinous dorsal rather low, its first 3 spines serrate in front, the second the highest, $\frac{1}{2}$ head; soft dorsal with first row serrated, its length $2\frac{1}{6}$ in head; anal lower, its longest ray $2\frac{3}{4}$ in head; caudal truncate, $1\frac{3}{8}$ in head; pectoral short, its middle rays longest, reaching fifth ray of soft dorsal, $2\frac{3}{5}$ in body; ventrals $1\frac{2}{5}$ in head; free rays tapering, $1\frac{2}{5}$ in head. Coloration not described; body and fins in figure unmarked, except pectoral, which is blackish at tip. Gulf of Fonseca; known from a single specimen 6.7 inches long. Here described from Richardson's figure, which gives details not mentioned in his description. Apparently a well-marked species with the spines of *Prionotus horrens*, but with a small mouth and rostral beak different from that of any other species. (*birostratus*, two-beaked.)

Prionotus birostratus, RICHARDSON, Voyage of the *Sulphur*, Ichthyology, pt. 2, 81, April, 1845, Gulf of Fonseca, west Coast of Central America. (Coll. Edward Belcher.)

2481. PRIONOTUS GYMNOSTETHUS, Gilbert.

Head $2\frac{1}{3}$; depth $3\frac{1}{8}$; eye 4 in head; snout $2\frac{7}{18}$; interorbital width 10; pectoral $1\frac{1}{2}$; ventrals $1\frac{4}{5}$; second dorsal spine 2. D. X or XI–10 or 11; A. 11. Body heavy anteriorly, tapering rapidly to the slender tail. Head large; striæ fine, numerous, scarcely to be distinguished on top of head, which is finely granular; snout long; profile concave, the orbital region abruptly elevated; preorbital on each side projecting beyond the mouth in a narrow lobe, which is usually sharply triangular, the 2 lobes strongly divergent; free edge of preorbital with a row of very fine serræ; anterior nostril with a long flap; mouth small, the maxillary $\frac{1}{3}$ length of head, a naked area behind it. Eyes very prominent, the preocular ridge high, bearing 1 strong spine; interorbital space very narrow, concave, $\frac{1}{10}$ length of head; a deep transverse groove on top of head behind eyes. Supraocular spine short and blunt; occipital and nuchal spines flat, bluntish; temporal ridge with 2 spinous projections; opercular, preopercular, and humeral spines, long and sharp; preopercular spine with a very strong accessory spine at base, from which a low ridge extends forwards to middle of cheek, where it ends in a weak spine. Gill rakers 1+7, slender, of moderate length. Second dorsal spine the highest, the first 2 spines minutely serrulated in front; pectorals very short, $\frac{1}{3}$ the length, reaching but little past front of anal; caudal slightly lunate. Scales very small, none on breast or belly, the naked area extending upwards behind pectoral fin to humeral spine, and narrowing backward to front of anal; region in front of spinous dorsal naked. Color in spirits, brownish above, light below, the dorsal region and top of head often with small dark spots; 1, or rarely 2, small black ocellated spots between fourth and fifth dorsal spines; pectoral mostly dusky, light at base below, and edged with white; a dusky blotch on outer portion of lower caudal lobe. Gulf of California; several specimens taken in shallow water. Length 3½ inches. Closely related to *Prionotus xenisma*, differing conspicuously in the wholly naked breast and belly. (Gilbert.) (*γυμνός*, naked; *στῆθος*, breast.)

Prionotus gymnostethus, GILBERT, Proc. U. S. Nat. Mus. 1891, 559, Gulf of California. (Coll. *Albatross.*)

2482. PRIONOTUS XENISMA, Jordan & Bollman.

Head 2½ to 2⅔ (3 to 3¼ in total); depth 3⅓ to 3½ (4 to 4¼); eye 4 in head. D. VIII–11; A. 10; scales in a longitudinal series 60 to 70, about 43 oblique series between gill opening and tail; 35 to 40 pores in lateral line. Body short and robust, little compressed, the width of the nape, between occipital spines, 6 to 6½ in head; head short and high; eyes prominent; the profile angulated, concave before eye, convex above it; snout short and broad, its breadth greater than its length, which is 2⅔ in head, its anterior margin deeply emarginate, the preorbital produced on each side into a broad, triangular, spiniferous lobe, which is nearly equal to ½ diameter of eye. Surface of bones of head finely and densely granular striate. Mouth small, maxillary 3 to 3⅓ in head, not reaching front of eye. Band of palatine teeth rather broad. Interorbital space narrow, deeply concave and granular striate, its least width 6 to 6½ in head; orbital rim elevated, its edges granular serrate; no distinct preorbital spine, whole edge of preorbital finely serrulate; a groove across top of head behind the blunt supraorbital spine. Occipital ridges present, the outer granular and not spinous, the inner rather sharply elevated into a short spine, the outer rather wide, extending to second dorsal spine; temporal region with an elevated roughish ridge, on which are 2 bluntish prominences; preopercular spine large and strong, with a smaller one at its base; opercular spine long and sharp; humeral spine usually larger than opercular; no spines on suborbital. Breast scaly; membranaceous flap of opercles not scaly. Gill rakers short, slender, longer than interspaces, and about equal to ⅗ of pupil; naked skin of throat with numerous papillæ; scales rather small, of about equal size on breast and belly, extending beyond base of pectorals, anterior margin forming an obtuse angle; 3 or 4 rows of rudimentary scales between occiput and dorsal. Spinous dorsal high, the first spine longest, 1¾ to 1⅘ in head; anterior margin of first 3 spines with numerous granulæ; second spine slightly more than 2 in head, all the spines stout; longest ray of second dorsal shorter than snout, 3⅙ in head; longest anal ray 3⅔ in head; caudal slightly lunate, 1¾ in head; pectorals quite short, reaching fifth ray of second dorsal, 3 in body; ventrals reaching anal, 1⅖ in head. Three short granular interspinal bones projecting through the skin between first and second dorsal, the anterior less robust than others. Coloration in spirits, grayish (probably red in life); dusky above and irregularly mottled; a distinct dark spot before base of caudal; dorsal dusky, with a large black, ocellated spot between fourth and fifth spines; dorsal spines with a row of dark spots on their anterior margin; soft dorsal with 3 rows of dark spots; pectorals blackish, a few of the upper rays pale on the inner side; ventrals and anal pale; caudal barred with dusky. Length 4 inches. Pacific coast of Colombia. Very many specimens dredged at a depth of 33 fathoms. (*ξένισμα*, a surprise.)

Prionotus xenisma, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 169, Pacific Ocean off coast of Colombia, at Albatross Station 2795, 7° 57′ N., 78° 55′ W. (Type, No. 41151.)

2483. PRIONOTUS LOXIAS, Jordan.

Head 2½; depth 3½. D. X–10 or 11; A. 10; scales about 50. Body stout; head large, rough; mouth moderate, maxillary not reaching front of orbit, 2⅔ in head; eye large, 3¾ to 4 in head; snout 2½ in head; opercular spine strong, nearly as large as preopercular spine; humeral spine small, not ½ as large as either of the others; interorbital area narrow, its ridge evenly concave, its width 2⅔ in eye; preopercular spine without smaller one in front; no spine at center of radiation of cheek; preorbital edge prominent, finely denticulated; supraorbital ridge prominent, with a bluntish spine before and behind; a transverse groove on head behind eye; snout broad, slightly emarginate at tip, the rostral plates not much projecting, their edges sharply and finely serrate, with 10 to 12 serræ; occipital ridges a short distance behind supraorbital ones, ending in a bluntish spine, as also the nuchal ridges. Teeth on jaws, vomer, and palatines in bands; lower jaw included; base of mandible below front of orbit; bones of cheeks and opercles with strong striæ, the rest of the bones of the head roughish. Gill rakers short, about 10 below the angle, the anterior ones tubercle-like; breast closely scaled. Pectorals short, 3¼ to 3½ in the length of the body, scarcely longer than longest detached ray, their tips reaching about third ray of anal fin, length 3½ in the body; ventrals long, their tips almost reaching tips of pectorals, 1⅔ in head; first dorsal spine the longest, its length 1⅕ in head, serrate in front; first dorsal ray slightly serrulate at base, its length 3 in head; longest anal ray 4 in head; caudal fin lunate, with pointed lobes, 1¾ in head. Color, brownish above, grayish below; head and anterior parts more or less distinctly vermiculated with dark olivaceous, these markings especially distinct on bones of head; sides with 6 to 15 narrow brown oblique bands extending downward and backward from the lateral line about halfway to anal fin, these obsolete or less conspicuous on anterior portion of the body; both dorsals mottled with olive; caudal with 3 broad blackish bars which do not cross the upper and lower ray, the last bar broad and very conspicuous; upper ray of caudal dark olive; no black spot at base of caudal; anal and ventrals white; pectorals blackish, faintly barred with darker and margined with white. Pacific coast of Central America. Here described from many specimens, 3 to 6 inches long, from *Albatross* Station 2805, where it occurs with *Prionotus xenisma*, but more abundantly than the latter. It has not yet been seen elsewhere. This species resembles *Prionotus xenisma* very closely. It is, however, a little more elongate, with rather smaller scales, the snout longer, the caudal fin barred, the body more vermiculate and with oblique bars, and no distinct dark spot at base of caudal. There is no trace of a second spine at the base of the large preopercular spine, and the humeral spine is much smaller than the opercular. Both have the snout somewhat birostrate, the forehead and eyes very prominent, and the pectorals very short. The projection of the lobes of the snout is, however, much less than in *Prionotus birostratus*, with which species the present one was at first identified. (*λοξίας*, *λοξός*, oblique, from the cross bars.)

Prionotus birostratus, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 170; not of RICHARDSON.

Prionotus loxias, JORDAN, in GILBERT, Proc. U. S. Nat. Mus. 1896, 452, at Albatross Station 2805, south of Panama, in 51½ fathoms. (Type, No. 47580, U. S. Nat. Mus.; cotype, No. 165, L. S. Jr. Univ. Mus.)

Subgenus MERULINUS, Jordan & Evermann.

2484. PRIONOTUS CAROLINUS (Linnæus).

(COMMON GURNARD; RED-WINGED SEA-ROBIN.)

Head 3; depth 5. D. X–13; A. 12; scales 58. Body not very slender; head moderate; mouth comparatively small, the maxillary about 3 in head, the mandible not reaching vertical from front of eye; groove across top of head behind eye, very conspicuous; interorbital area moderately concave, rather broad, about equal to diameter of eye; bones of head comparatively smooth, the preocular, postocular, occipital and nuchal spines low, depressed; temporal ridge conspicuous, without spines; 1 or 2 small spinules on lower edge of preopercle, below the preopercular spine; preopercular spine with no smaller one at its base in front; pectoral fin short, reaching little past front of anal, its length less than ½ the body; gill rakers of moderate length, about 10 developed; no spine on cheek bone or on sides of snout. Dorsal spines low, the second 2⅛ in head, the first moderately serrate; base of soft dorsal equal to distance from tip of snout to tip of humeral spine; caudal fin lunate, its outer rays ⅛ to ¼ longer than inner; pectoral fin somewhat rounded, rather short, not reaching last ray of anal and not more than ½ the length of the body; the longest ray about the fifth; free rays of pectoral expanded toward tip, with decurrent membrane; scales rather large, about 58 pores. Body and fins nearly plain, mottled with darker, but without well-defined spots except the dorsal ocellus; back with 4 obscure cross blotches; 2 or 3 oblique pale streaks across spinous dorsal; gill membranes dusky. Young with head rougher, pectoral fins shorter, dark spots on body more distinct. Coast of Maine to South Carolina, chiefly northward; very abundant on the coasts of southern New England and New York, but rarely taken as far south as Charleston. Our specimens are from Menemsha Bight, Marthas Vineyard. (*carolinus*, from Carolina.)

Trigla carolina, LINNÆUS, Mantissa, 176, 528, Carolina.

Trigla palmipes, MITCHILL, Trans. Lit. and Phil. Soc. New York 1814, 431, pl. 4, fig. 5, New York Harbor.

Prionotus pilatus, STORER, Proc. Bost. Soc. Nat. Hist., II, 1845, 77, Massachusetts Bay, adult specimens; STORER, Hist. Fish. Mass., 68, pl. 6, fig. 1, 1867; GOODE & BEAN, Bull. Essex Inst., XI, 12, 1879.

Prionotus carolinus, Cuvier & Valenciennes, Hist. Nat. Poiss., IV, 90, 1829; Storer, Report Fishes Mass., 14, 1839; De Kay, New York Fauna: Fishes, 46, pl. 5, fig. 15, 1842; Ayres, Bost. Journ. Nat. Hist., IV, 1842, 258; Günther, Cat., II, 192, 1860; Gill, Cat. Fish. East Coast N. Am., 21, 1873; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1878, 373; Bean, Proc. U. S. Nat. Mus. 1880, 84; Goode & Bean, Bull. Essex Inst., XI, 12, 1879; Jordan & Hughes, Proc. U. S. Nat. Mus. 1886, 333.

Prionotus palmipes, Storer, Hist. Fish. Mass., 66, pl. 5, fig. 1, 1867; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1883, 614; Jordan & Gilbert, Synopsis, 734, 1883; Goode, Nat. Hist. Aquatic Animals, 255, pl. 71, 1884; Goode & Bean, Oceanic Ichthyology, 468, 1896.

2485. PRIONOTUS SCITULUS, Jordan.

Head 2¾ to 3⅔; depth 5⅓ to 6⅓. D. X–13; A. 12; scales rather small, about 60; 52 pores; body much slenderer than in any other species; head small, low, rather pointed. Snout rather long, a little shorter than rest of head, its width between angles of mouth about 2½ in head. Maxillary not reaching front of eye, 2⅔ in head. Sides of snout finely and evenly serrate; mouth comparatively small, the maxillary less than ⅔ the length of the head; groove across top of head behind eye, little conspicuous; interorbital area narrow, deeply concave, its width about ⅔ the diameter of the eye; bones of the head very smooth, the striations very weak; spines on top of head preocular, supraocular, occipital, and nuchal) short and sharp, not depressed; temporal ridge blunt, without spine; 1 or 2 small spinules on lower edge of preopercle, below the preopercular spine; dorsal spines very high, the second 1¾ in head, the first moderately serrate; soft dorsal high, its base about ¼ longer than head; caudal truncate, its third ray longest, the others, to the tenth, little shorter; free rays of pectoral a little expanded at tip; scales rather small. Bands of palatine teeth narrow. Gill rakers long and slender. Pectoral in male 2⅛ to 2⅖ in body, in female scarcely more than ⅓ length of body, reaching to base of fifth or sixth dorsal ray. Coloration of female in life, dark olive above; back and sides covered with numerous round spots of different sizes, and not arranged in series, these spots bronze color in life, becoming brownish after death; spinous dorsal dusky, with lighter streaks; a distinct black spot on upper half of spinous dorsal, between the fourth and fifth spine, this spot being ocellated below and behind; a second black blotch on upper half of first spine and membrane, also ocellated behind; second dorsal and caudal spotted and finally blotched with black; anal largely black, with a pinkish border; pectorals blackish; ventrals pale; branchiostegals pinkish. Male in life, light olive brown, with 4 saddle-like dark blotches on back, 1 downward and forward from middle of spinous dorsal to humeral spine; a second from front of soft dorsal; a third from end of dorsal downward and forward to below lateral line, thence continued forward as a narrow horizontal streak; a fourth on caudal peduncle; sides everywhere with reddish brown spots, as in the female; opercle reddish brown; branchiostegal membrane and palatine region largely jet-black; spinous dorsal olive brown, with 2 irregular, lengthwise, translucent streaks and an intense well-defined black spot on membrane above, between fourth and fifth spines; second dorsal olive brown, vermiculated with whitish translucent, and without round spots; caudal reddish brown, blackish toward tip, with a conspicuous, white, longitudinal streak on upper lobe; anal blackish, with white base and margin; pectoral dark brown, irregularly barred and blotched with greenish and light brown; free rays of pectorals and inner face of ventrals dusky, tinged with orange. South Atlantic coast of United States, Beaufort to St. Augustine; a very well-marked species, rather common within the region from which it is known. Length 5 to 6 inches. (*scitulus*, slender.)

Prionotus punctatus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 373; GOODE, Proc. U. S. Nat. Mus. 1879, 111; GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 338; JORDAN & GILBERT, Synopsis, 734, 1883; not *Trigla punctata*, BLOCH.

Prionotus scitulus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 288, Beaufort (Coll. Jordan, Brayton & Gilbert); JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 614; JORDAN, Cat. Fish. N. A., 114, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 333.

2486. PRIONOTUS ROSEUS, Jordan & Evermann.

Head $3\frac{1}{6}$ in length (4 with caudal); depth 6 ($7\frac{1}{2}$); eye moderate, $5\frac{1}{5}$ in head. D. X–12; A. 12; scales (transverse series) 65 to 70; pores in lateral line 60 to 65. Allied to *Prionotus scitulus*. Body quite slender, little compressed, narrowed above, width of nape between occipital spines being about $\frac{1}{5}$ of head; head quite short and rather high; eyes prominent, so that the anterior profile forms a sharp angle at front of eye, and is somewhat concave; snout rather narrow, $2\frac{1}{6}$ in head, its tip somewhat emarginate; edges of snout finely serrulate and without spine; surface of bones of head comparatively smooth, the small granulations arranged in distinct, fine, radiating striæ. Mouth small, the maxillary $3\frac{1}{4}$ in head, the mandible not quite reaching front of orbit; band of palatine teeth narrow. Apparently a slight cirrus above eye, on one side, in typical example, possibly a result of mutilation. Interorbital space narrow, deeply concave, its least width $7\frac{1}{4}$ in head; orbital rim considerably elevated, both in front and behind, its edge granular serrate; a shallow groove across top of head behind orbital rim, which does not end in a distinct spine; occipital ridges weak, the inner pair without spines, the outer with short ones which reach somewhat beyond front of dorsal; temporal region with an elevated roughish ridge, but without distinct spine; preopercle with a single moderate spine, which has no smaller one at its base, either in front or below; opercular spines small and sharp; humeral spine moderate; no trace of spines on suborbital or preorbital, the head being provided with but 5 pairs of spines, including the humeral spine; membranaceous flap of opercle scaly. Gill rakers short and thickish, about 8 developed, these little longer than the interspaces, and not $\frac{1}{2}$ length of pupil and nearly $\frac{1}{2}$ as broad as high. Scales small, those on breast much reduced in size, about 12 between occiput and dorsal. Spinous dorsal high, the first spine serrulate in front, shorter than the second, which is $1\frac{3}{5}$ in head. (Second dorsal and anal mutilated.) Caudal slightly and unequally lunate, the lower lobe the longer, $1\frac{1}{6}$ in head; pectoral reaching nearly to last rays of dorsal, a little more than $\frac{1}{2}$ length of body; ventrals as long as head. Coloration in spirits, grayish, unspotted, more dusky above; dorsal dusky, with no very distinct markings; caudal fin yellowish, marked at base with dusky, its tip black; pectorals mostly black; lower fins pale. In life the type was chiefly pinkish red, which color still persists on the inside of opercles. Deep waters of Gulf of Mexico, known only from the "spewings" of Red Groupers, on the Snapper Banks off Tampa Bay and Pensacola. Length of type 6½ inches. (*roseus*, rose red.)

Prionotus scitulus, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 288, mutilated specimen from Pensacola; not type.

Prionotus roseus, JORDAN & EVERMANN, Proc. U. S. Nat. Mus. 1886, 470, off Tampa Bay, Florida. (Type, No. 37989; Coll. Chas. H. Bollman.)

2487. PRIONOTUS ALATUS, Goode & Bean.

Head 2½; depth 4. D. X–12; A. 11; caudal 3–7 + 5–4; pectoral 13 + 3; ventrals I, 5; lateral line about 100; tube-bearing scales about 50. Body normal in form, rather robust; its greatest width ⅕ its greatest length without caudal; least height of tail contained 12 times, or nearly so, in the standard body length, and 3 times in height of body. The number of rows of scales, counting diagonally around the body from origin of anal, is 21 below and 7 above the lateral line. Width of head equal to its height; upper limb of orbit encroaching upon the upper profile of head, the center of the pupil equidistant from tip of snout and tip of the prolonged preopercular spine; length of snout measured obliquely from anterior margin of orbit equal to that of the postorbital portion of head to end of opercular spine; a robust spine at lower angle of preoperculum, curving slightly upward, the length equal to that of first dorsal ray; this spine serrated upon its outer edge, and with a small spine at its base which is also serrated; the tip of the spine extending to perpendicular from center of the interspace between third and fourth dorsal spines, while that of the humeral spine extends to the perpendicular from the interspace between the fourth and fifth, and that of the opercular to the perpendicular from the center of base of third; a strong scapular spine extends back to the posterior edge of the second dorsal spine. Length of upper jaw equal to ⅓ that of head. Palatine teeth in short feeble bands, hardly perceptible, even with a strong magnifying glass. Gill rakers 6, besides several rudimentary ones, 5 being below the angle, and the longest equal in length to ⅓ diameter of eye. First dorsal fin inserted above tip of upper opercular spine and at a distance from snout equal to twice length of the fourth dorsal spine, height of first dorsal spine, which is equal to that of the third and slightly less than that of the second, equal to ½ length of head, its anterior margin strongly serrated, while those of the second and third spines are less markedly so; length of base of first dorsal equal to greatest height of body; the distance between its insertion and that of second dorsal fin equal to the length of the longest and superior detached pectoral ray; second dorsal fin inserted in the perpendicular over the interspace between the second and third anal rays, the length of its longest ray equaling twice the least height of tail, and the length of its base equaling the greatest length of the ventral rays, its first ray conspicuously serrated on its anterior edge. The insertion of the anal fin is in the perpendicular below the end of the first dorsal fin; the length of its longest rays is equal to ½ that of the middle caudal rays; caudal truncated, very slightly emarginate; pectoral very peculiar in structure, its longest ray, the ninth, reaching to base of the caudal rays and equal in length to 4 times that of the fourth dorsal spine; the tenth ray a trifle shorter, extending nearly to the end of the soft dorsal; the eleventh, twelfth, and thirteenth rays graduated, decreasing in regular proportion, the thirteenth being less than ¼ as long as the tenth; the eighth about midway between the tenth and the eleventh; the first slightly longer than the twelfth, and those intermediate between the first and the eighth are graduated in length, so as to form a rounded outline for the anterior or upper portion of the fin; the pectoral appendages slender, the third being slightly greater in length than the thirteenth ray, being ⅔ as long as the first, while the second is intermediate between the other two; the ventral inserted directly under the base of the pectoral appendages, its first spine about equal in length to the preopercular spine from the base of the supplemental spines, its longest, the third and fourth, exactly equal in length to the base of the second dorsal. Color brownish above, with about 4 indistinct transverse band-like blotches, 1 of which is on the base of the caudal, whitish beneath; vertical fins uniform, the tips of the caudal rays blackish, with 2 indistinct cloud-like bands in advance of the terminal bands thus formed; a black blotch, with whitish anterior margin on the membrane between the fourth and fifth dorsal spines; a very inconspicuous blackish spot on the membrane between the fifth and sixth; others still less conspicuous on the succeeding interspaces; the pectoral blotched and clouded with blackish brown and white. Off Charleston, South Carolina; 1 specimen obtained in the same haul with *Notosema dilectum*. (Goode & Bean.) It is a very well-marked species, distinguished especially by its very long pectoral fin. (*alatus*, winged.)

Prionotus alatus, GOODE & BEAN, Bull. Mus. Comp. Zool., XIX, 210, 1883, deep sea off Charleston, South Carolina; JORDAN, Cat. Fish. N. Am., 114, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 332; GOODE & BEAN, Ocean. Ichth., 467, 1896.

Subgenus PRIONOTUS.

2488. PRIONOTUS MILES, Jenyns.

Head 2⅘; depth 4½; eye 4⅓ in head. D. X–12; A. 10 or 11; scales about 78. Body elongate, rather slender. Head moderate, not very rough; mouth moderate, maxillary scarcely reaching front of orbit, 2½ in head; interorbital area concave, narrow, 1⅔ in eye; no transverse postorbital groove; no spine on center of radiation of cheek, opercular spine rather weak, less prominent than the humeral spine, preopercular spine slightly larger than the humeral spine, no smaller one before it; all of the spines simple; preorbital ridge serrulate, no conspicuous postorbital ridge; temporal ridges present, all of the bones of the head with radiating striæ; snout emarginate, about 10 prominent spinules on each lobe, teeth on vomer in 2 patches, on jaws and palatines in bands. Gill rakers rather long, about 10 below the angle, 3 or 4 tubercles on anterior part of arch. Pectoral fins long, reaching to middle of the anal fin; first dorsal spine weaker and shorter than the second, its length 2⅔ in the head, longest dorsal spine 2⅓ in head; ventrals reaching front of anal, 1⅓ in the head; first dorsal spine finely serrulate, other spines not serrated; caudal emarginate, 4½ in the length of the body. Color uniform brownish above, distal ¾ of spinous dorsal black; soft dorsal and caudal faintly barred; ventrals and anal white; pectorals blackish with white margins. Galapagos Islands; not rare. Here described from numerous fine specimens, 8 to 10 inches in length, from the Galapagos. (*miles*, a soldier.)

Prionotus miles, JENYNS, Zool. Beagle, Fishes, 29, pl. 6, 1842, Chatham Island, Galapagos Archipelago (Coll. Charles Darwin); GÜNTHER, Cat., II, 196, 1860.

2489. PRIONOTUS STEPHANOPHRYS, Lockington.

Head 2⅔; depth 4; eye 1⅓ in snout. D. X–12 or 13; A. 11 or 12; P. 13+3; scales 55. Body rather stout; head large, compressed, broad, and very nearly plane above, the interorbital region not concave; no transverse furrow behind orbits; orbital rim with a slightly raised, serrated crest; snout very short, ⅖ length of head; mouth large, the broad maxillary reaching beyond front of orbit; bands of palatine teeth very narrow; gill rakers rather long and slender; head less rough than usual, the bones little striate; occipital process not reaching first dorsal spine; preorbital little projecting; preopercle with a strong smooth spine, reaching slightly beyond membrane of opercle; opercle ending in 2 points, the lower a long spine, the membrane connecting the 2 scaly; scales thin, ciliate, not closely imbricate; first dorsal spine granulate in front; pectorals reaching beyond middle of anal, about to base of ninth ray; free rays very slender, the uppermost more than ½ length of fin; ventrals not reaching vent; caudal slightly emarginate. Pale olivaceous, abruptly white at level of pectorals; back and sides with a few scattered dark spots; branchiostegals mostly saffron yellow; spinous dorsal dusky, with diffuse dark blotches most distinct between fourth, fifth, and sixth spines; second dorsal spotted; caudal with dark blotches; pectorals dark, with large, round, black spots. Deep water off San Francisco, Point Reyes, Monterey, and Lower California; 4 specimens known. Here described from Mr. Lockington's type, and from 2 others collected by the *Albatross* at Station 3041, coast of Lower California. (*στέφανος*, crown; *ὀφρύς*, eyebrow.)

Prionotus stephanophrys, LOCKINGTON, Proc. U. S. Nat. Mus. 1880, 529, Point Reyes, near San Francisco; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1880, 454; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1881, 62; JORDAN & GILBERT, Synopsis, 736, 1883; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 334.

2490. PRIONOTUS QUIESCENS, Jordan & Bollman.

Head 2½ to 2¾ (3⅕ to 3⅓ with caudal); depth 4 to 4½ (5 to 6); eye moderate, 4⅓ to 5 in head. D. X–12; A. 11; scales, in lateral line, 50 to 55; in a longitudinal series 60 to 70. Body rather slender, compressed, not much narrowed above, the width of the nape between the occipital spines 4 to 4⅕ in head; head moderately elongate, not elevated; eyes not prominent, the profile from snout to nape almost straight or slightly convex; snout broad, of about equal length and breadth, 2½ to 2⅔ in head; anterior margin emarginate; preorbital little projecting, its edge with about 15 to 20 fine serræ, the anterior strongest with the exception of the last one, which is directed backward. Surface of bones of head smoother than usual in this genus and with fine radiating granular striæ, those on opercles, cheeks, and top of head most strongly developed. Mouth rather large, maxillary 2½ in head, reaching slightly beyond anterior orbital rim. Band of palatine teeth narrow. Orbital rim not especially elevated, its edges granulated, especially anteriorly, preorbital and postorbital spines small and blunt; interorbital not deeply concave, rather wide, its least width 4⅔ to 5 in head; no groove across top of head behind orbital rim; occipital ridges present, the inner very low, ending in a very small spine; outer large, ending in a moderate spine, the pair diverging, their inner edges serrulate, the spines extending to nearly opposite first dorsal spine; temporal region with a slight elevated roughish ridge, but no spine; preopercular spine long and sharp, its anterior edge somewhat serrulate, no smaller spine below it and none on suborbital stay; opercular and humeral spines well developed, sharp; no trace of spines on suborbital or preorbital. There are but 3 distinct spines on each side of the head, occipital, opercular, and preopercular. Membranaceous flap of opercle with a few scales. Gill rakers long and slender, about equal to ½ diameter of eye, 8 to 10 well developed. Scales quite small, those on breast (between ventrals) larger than those on belly or throat; scales extending beyond base of pectorals to isthmus; about 12 to 15 rows between occiput and front of dorsal. Spinous dorsal rather low; first spine not strongly serrulate, ¾ length of second, which is 2½ in head; first ray of second dorsal weakly serrulate at base; longest ray shorter than snout and slightly less than 3 in head; longest anal ray 3½ in head; caudal lunate, 1½ to 1⅔ in head; pectoral generally reaching last dorsal ray, a little more than ½ body; ventrals reaching vent, 1⅖ to 1½ in head. Coloration in spirits, grayish, unspotted, more dusky above; spinous dorsal dusky, a distinct black spot between fifth and sixth spines; soft dorsal with 3 rows of diffuse spots; caudal dusky on the outer ⅗ and base; pectorals mostly black, with faint pale cloudings; ventrals and anal pale; body largely red in life. Related to *Prionotus stephanophrys*, Lockington, but the interorbital area concave; the bones of head much striate and granulated, and the caudal differently colored. It also bears some resemblance to the Atlantic species *Prionotus stearnsi*. Pacific Ocean, the types taken off the coast of Colombia; abundant in various places in 7 to 60 fathoms; also found at *Albatross* Station 3039, in the Gulf of California. (*quiescens*, resting quietly.)

Prionotus quiescens, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 166, off Pacific coast of Colombia, at Albatross Stations 2800, 2801, 2802, and 2805. (Type, No. 41153, U. S. Nat. Mus. Coll. *Albatross*.)

2491. PRIONOTUS ALBIROSTRIS, Jordan & Bollman.

Head 3 in length (3¾ with caudal); depth 4½ (5¾); eye rather large, 4½ in head. D. X–12; A. 11; pores along lateral line 50 to 55. Body moderately elongate, little compressed, narrowed above, the width of the nape between the occipital spines being 4½ in head; head rather short and high; eyes prominent, the anterior profile regularly concave, the eyes and forehead less prominent than in *P. rubio*. Snout broad, its breadth at angle of mouth almost equal to its length, 2⅓ in head, its anterior margin not produced, but slightly emarginate; serræ short and even, bluntish, about 20 well developed; whole edge of preorbital with fine serræ. Anterior nostril with a large flap. Surface of bones of head with strong radiating striæ, those in front of eyes most broken up into granulations. Mouth moderate, maxillary 2¾ in head, not reaching front of eye; band of palatine teeth rather broad. Interorbital space narrow, deeply concave, smoother than rest of head, its least width 6½ in head; orbital rim elevated, with coarse spine-like striæ in front, inner largest, forming the preocular spine; upper margin with moderate, strong serræ ending behind in a large, supraocular spine; no groove across top of head behind orbital rim; occipital ridges strong, the inner pair with a few asperities at base, ending in a compressed spine, the outer with stronger serræ at base and extending to opposite first dorsal spine; temporal ridge slightly crenulate, with 2 blunt spines; preopercular spine without a smaller one at base, but with a high sharp ridge before it, serrulate at base, this ridge not ending in a distinct spine; edge serrulate; suborbital stay with an elevated serrulate ridge, but no spine; opercular spine small and blunt, smaller than the strong humeral spine; no spines on suborbital or preorbital; membranaceous flap of opercle scaly. Gill rakers rather short, longer than interspaces, the longest rather less than ⅓ eye, 5 most strongly developed. Scales small, those on belly smaller than those on breast, not extending before a line drawn between base of pectorals and ventrals; about 7 scales between occiput and dorsal; spinous dorsal moderately high, the first spine very strongly serrulate in front, shorter than second, which is ½ head; first ray of second dorsal serrulate at base, the longest ray very slightly longer than snout; longest anal ray 3 in head; caudal subtruncate, 1⅓ in head; pectorals long, reaching to the last dorsal ray or even farther in young specimens, 1$\frac{9}{10}$ in body; ventrals reaching third anal ray, 1¼ in head. Coloration in spirits, grayish, unspotted, darkest above, and with darker cross shades; snout and jaws white; the tip of each jaw, a bar across each jaw, and 1 behind angle of mouth, black; a black bar on anterior and another on posterior part of interorbital, the latter extending across the cheek; first dorsal dusky, vaguely clouded with darker; second irregularly spotted, its posterior half dusky; caudal broadly black at base and tip, its middle part yellowish; pectorals dark, with a slight violet shade and traces of darker mottlings; middle of anal dusky; ventrals dusky on upper surface. Pacific coast of tropical America; taken at *Albatross* Station 3014, in Gulf of California; also known from several specimens, the largest 5½ inches long, dredged at *Albatross* Station 2795, at a depth of 33 fathoms. It approaches *Prionotus quiescens* in technical characters, but is very different in appearance; easily distinguished by the form, armature, and coloration of the head. (*albus*, white; *rostrum*, snout.)

Prionotus albirostris, JORDAN & BOLLMAN, Proc. U. S. Nat. Mus. 1889, 168, Pacific Ocean off the coast of Colombia, at Albatross Station 2795, 7° 57′ N., 78° 55′ W. (Type, No. 41162, U. S. Nat. Mus.)

2492. PRIONOTUS RUBIO, Jordan.

(RUBIO VOLADOR.)

Head 3; depth 5. D. X–11; A. 10; scales about 57, pores 52. Body not very slender; gill rakers very short, tubercle-like, 9 or 10 developed, little if any longer than the interspaces; first dorsal spine nearly smooth; mouth not very large, the maxillary 2½ to 2¾ in head; interorbital space moderately concave, its width about ⅘ length of eye; no cirrus above the eye; distance from supraocular spine to nuchal scales about equal to eye; supraocular and nuchal spines low; occipital spines wanting; temporal ridge sharp, ending in a blunt spine; preorbital projecting, strongly serrate; a blunt spine on each side of snout, behind serræ of preorbital; a blunt spine behind this above angle of mouth; no spine on cheek bone in adult; upper opercular spine almost obsolete; bones of head rather strongly striate, but not granulate; scales rather large, about 52 pores; first dorsal spine not much shorter than second, which is 2⅕ in head; caudal very slightly concave; pectorals longer than in any other species (except *alatus*), reaching entirely past bases of dorsal and anal, its tip subtruncate, the longest ray about the ninth; ventrals reaching a little past vent. Color in life, dark olive, with rivulations of light green; sides shaded with pale salmon color; edge of pectoral light blue, ventrals reddish; upper fins marked with different shades of brown. From related species, *P. rubio* is well distinguished by its long pectorals, and by its very short gill rakers, much shorter than in any other species, *P. ophryas* coming nearest it in this respect. West Indies; not rare; our specimens from Cuba and Jamaica. (*rubio*, robin, the Spanish name.)

Rubio volador, PARRA, Descr. Dif. Piezas de Hist. Nat., 1787, lam. 38, Havana.

Prionotus punctatus, POEY, Synopsis, 304, 1868; POEY, Ennumeratio, 41, 1875; JORDAN & GILBERT, Synopsis, 956; not *Trigla punctata* of BLOCH.

Prionotus rubio, JORDAN, Proc. U. S. Nat. Mus. 1886, 50, Havana (Coll. Jordan); JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 334.

2493. PRIONOTUS OPHRYAS, Jordan & Swain.

Head 3 in length (3⅞ with caudal); depth 4½ (5⅚); eye 4½ in head. D. VIII–13; A. 11; scales (transverse series) about 75; pores in lateral line about 50. Body rather slender, narrower anteriorly and more compressed above than in other species, the width of the nape between the outer pair of occipital spines being not quite ¼ the length of the head; upper profile of head peculiar, being nearly straight from above front of eye backward, and steep and strongly concave from front of eye to tip of snout, the snout, therefore, steeper, more depressed, and rather shorter than in related species, its length being 2¼ in head; snout not very broad, its front broadly rounded, its tip, as usual, emarginate, its edge with fine serræ directed backward, but no spines; surfaces of bones of the head covered with fine, sharply defined striæ, but with none of the small granulations which are found in *P. strigatus* and other species. Mouth rather wide, the maxillary reaching nearly to front of eye, the mandible quite to front of eye; maxillary 2½ in head; band of palatine teeth of moderate length, as long as eye. Eye large, placed high; upper part of eye with a fleshy cirrus rather enlarged toward the tip and fringed, this resembling the cirri in *Scorpæna*, its length about ½ that of the eye; interorbital area very narrow and very deeply concave, its least width little more than ⅛ the length of the head and not ⅔ the length of the eye; depth of interorbital area nearly ⅓ length of eye; bone forming anterior portion of orbital rim very prominent, forming a strongly striated crest, each of the striæ ending in a projecting point or spinule; upper portion of orbital rim prominent, even, ending behind the eye in a sharp backward-directed spine, behind which is a short cross groove, which does not extend across the top of the head; distance from the base of this spine to the scales on nape very short, not more than ½ the length of the eye; both pairs of occipital spines distinct, the outer and larger ones extending to opposite front of dorsal; a small spine on temporal region in front of outer pair of spines; preopercle with a single moderate spine at the end of a long ridge; no smaller spine at its base; opercle strongly striate, with 2 strong spines, of which the upper one is proportionately larger than usual; a single, rather strong humeral spine; membranaceous flap of opercle scaly. Gill rakers very short and thick, about 9 developed, these not ½ longer than the interspaces, and not ¼ length of eye; they are about ½ as broad as high, thus having a form very different from that seen in *P. evolans*, *P. strigatus*, *P. tribulus*, etc. Scales rather large, the scales on the back little reduced in size, about 10 between occiput and dorsal fin (17 in *P. strigatus*). Dorsal spines high and rather slender, the first rather the highest, its length 1½ in head, its anterior margin not granulated; soft dorsal rather high, its longest ray 2 in head; caudal 1⅓ in head; longest anal ray 2⅓ in head; pectorals rather long, extending nearly to last rays of dorsal, their length almost twice head; detached rays moderate, the uppermost or longest 1⅓ in head; ventrals 1⅙ in head. Coloration largely faded in the typical example; deep crimson in life; pale below; caudal with 2 dark cross bands; pectorals dusky, the free rays with dusky spots; ventrals pale, with some dusky bands; head nearly plain, the cirri dark. A second specimen, in very bad condition, has since been obtained by us from the same source. In this the undigested parts of the head and body are of a deep crimson. Probably all the deep-water species of this genus will be found to be red in life. Gulf of Mexico, in deep water; known only from the Snapper Banks, near Pensacola. Described from the original type, 7¼ inches long, taken from the stomach of a Red Snapper (*Neomænis aya*), from the Pensacola Snapper Banks, by Mr. Silas Stearns. (*ὄφρυας*, having projecting eyebrows.)

Prionotus ophryas, Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 542, Snapper Banks off Pensacola (Type, No. 36944. Coll. Silas Stearns); Jordan, Cat. Fish. N. Am., 115, 1885; Jordan & Hughes, Proc. U. S. Nat. Mus. 1886, 334.

2494. PRIONOTUS STEARNSI, Jordan & Swain.

Adult example: Head 2⅘ in length (3⅓ with caudal); depth 4⅕ (5⅕); eye 5½ in head. D. VIII or IX–12; A. 12; scales in transverse series about 50; pores in lateral line about 52; length of specimen, 14½ inches. Body rather robust, formed much as in *P. tribulus;* width of nape between occipital spines not quite ⅕ length of head; head very large, broad, and unusually smooth, the profile, except for the prominence of the orbital region, forming a very gentle and somewhat regular arch; snout very broad, truncate at tip, its breadth at tip 3⅕ in head, its length 2⅖; edge of snout granular, without spines. Surface of all bones of head very finely, evenly, and regularly striated, the striæ much finer than in *P. tribulus*, their granulations all minute. Mouth wide, the maxillary reaching front of eye, its length about 2½ in head. Band of palatine teeth well developed. Eye large, placed high; no cirri; interorbital space about as in *P. tribulus*, rather broad and moderately concave, wider than the eye, and about 5 in head. Bone at anterior portion of orbital rim very prominent, serrulate, its principal ridge ending in a stout, blunt spine; supraorbital rim little prominent and without spine; no cross groove on top of head; a slight, bluntish spine behind eye; no spines on temporal ridge; outer pair of occipital spines short, strong, compressed, not quite reaching front of dorsal; inner pair and their ridges obsolete; opercular and preopercular spines short, the latter with no smaller one at its base; upper opercular spine very weak; humeral spine moderate; membranaceous flap of opercle with about 5 rows of scales; no spine on cheek bone. Gill rakers short and few, little longer than in *P. ophryas*, the longest about ⅓ interorbital width, about ½ longer than the interspaces, and perhaps 5 times as high as broad; about 9 gill rakers developed. Scales comparatively large, those on the back little reduced in size, about 10 before dorsal fin; 7 scales in a vertical row from first ray of soft dorsal to lateral line. Dorsal fins rather low and strong (the first injured), with its anterior margin not granulated; the third 2⅔ in head; soft dorsal moderate, its longest ray 3¼ in head; caudal very slightly concave, its longest rays 1⅘ in head. Pectoral fins rather short, reaching third ray of anal, 2½ in body, their length little more than length of head; detached rays tapering, a little more than ½ head; ventrals about reaching vent, 1¼ in head. Color in alcohol, nearly plain brownish olive, with dark shades at the bases of many of the scales, giving a mottled appearance; head everywhere conspicuously reticulate with blackish, in fine pattern; pectoral fin dusky, with a network of fine black cross streaks; dorsals similarly marked, the spinous dorsal with a diffuse black blotch between the fourth and sixth spines; caudal plain, slightly dusky; anal and ventrals pale; pectoral filaments nearly so. In the young the body is more slender, the snout less broad, with a slightly emarginate tip, eye larger, 4⅔ in head; no spine or groove behind the eye; gill rakers more slender, about 13 in number. Gulf of Mexico; in deep water. Known from 2 specimens, both taken on the Snapper Banks, off Pensacola, by Mr. Silas Stearns. The original type is a small specimen, not 4 inches long. The other is very large, about 13 inches long, larger than any other specimen of *Prionotus* which we have ever seen. In spite of the remarkable differences in appearance of the two specimens, there is little reason to doubt their specific identity, as very similar differences distinguish the young and old of *P. tribulus.* According to Mr. Stearns, the large specimen was in life of a bright crimson red. Of all the species of the genus the present one has the spines of the head least developed, its upper surface being almost smooth. (Named for the late Silas Stearns, of Pensacola, long a volunteer assistant to the U. S. Fish Commission, and a most intelligent student of economic questions in marine ichthyology.)

Prionotus stearnsi, JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 541, Pensacola, young (Type, No. 36943. Coll. Silas Stearns); JORDAN, Cat. Fish. N. Am., 115, 1885; JORDAN, Proc. U. S. Nat. Mus. 1886, 228, adult; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 335; GOODE & BEAN, Oceanic Ichthyology, 466, 1896.

2495. PRIONOTUS STRIGATUS (Cuvier & Valenciennes).

(NORTHERN STRIPED GURNARD; BROWN-WINGED SEA-ROBIN.)

Head 2¾; depth about 4. D. X–12; A. 11; scales 50 to 60 pores. Body rather robust; head moderately large; preopercular spine with a distinct smaller one at the base. Caudal fin very slightly lunate; pectoral fin subtruncate. Cheek bone without distinct spine at the center of radiation; edge of preorbital granular-serrate, without distinct spine, the serræ about 12 in number on each side; temporal ridges roughish, but without spines; bones of the head with the striæ coarsely granular; mouth moderate, the maxillary about 2⅗ in head; head not very broad, the spines on its upper surface, except the nuchal spine, inconspicuous. Gill rakers longer and slenderer than in other species, 15 to 20 developed. Coloration brownish; side with a very distinct dusky bronze band below the lateral line and parallel with it, this becoming broken posteriorly into a series of roundish dark spots; some dark streaks and clouds below this stripe; fins with dark clouds, the soft dorsal with 2 dark blotches, which extend as bars on the back; head with scattered dark spots; dusky area below eye; pectoral with its rays each crossed by fine black bars, these especially distinct toward the base of the fin; free rays spotted; interorbital area broad and almost flat, its width a little more than length of eye; first dorsal spine granulated; second spine 2¾ in head; pectorals about ½ the length of the body. Atlantic coast of the Northern States, Cape Cod to Virginia; very common in shallow water. The specimens here described from Marthas Vineyard. It is extremely close to *Prionotus evolans,* of which it may be a geographical variety. We have, however, as yet seen no intermediate examples, which should be looked for off the coast of Virginia. (*strigatus,* striped.)

Trigla lineata, MITCHILL, Trans. Lit. and Phil. Soc. New York, I, 1814, 430, pl. 4, fig. 4; not *Trigla lineata,* BLOCH.

Trigla strigata, CUVIER, Règne Animal, Ed. II, vol. 2, 161, 1829, New York; after *lineata,* MITCHILL.

Prionotus lineatus, DE KAY, New York Fauna: Fishes, 45, pl. 4, fig. 12, 1842; STORER, Synopsis, 50, 1846; GÜNTHER, Cat., II, 192, 1860.

Prionotus evolans var. *lineatus,* JORDAN & GILBERT, Synopsis, 736, 1883.

Prionotus strigatus, CUVIER & VALENCIENNES, Hist. Nat. Poiss., 86, 1829; STORER Report Fish. Mass., 12, 1839; AYRES, Bost. Journ. Nat. Hist., iv, 1842, 258; JORDAN & GILBERT, Synopsis, 974, 1883, note; JORDAN, Cat. Fish. N. Am.. 115, 1885; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 335.

Prionotus evolans, GOODE & BEAN, Bull. Essex Inst., XI, 12, 1879; BEAN, Proc. U. S. Nat. Mus. 1880, 84; GOODE, Nat. Hist. Aquatic Animals, 255, pl. 71, 1884, and of writers; not *Trigla evolans*, LINNÆUS.

2496. PRIONOTUS EVOLANS (Linnæus).

(SOUTHERN STRIPED GURNARD.)

Head 2⅗; depth 4¾. D. X–12; A. 11; lateral line with 53 pores; soft dorsal high, longest ray equaling longest spine, 2½ in head; caudal 3½ in length. Body and head stouter than in *Prionotus strigatus;* edge of preorbital granular-serrate, without distinct spine, the serræ about 12 in number on each side; mouth moderate; preopercular spine with a smaller one at its base; scales larger than in *Prionotus strigatus*, 8 + 1 + 21 in a vertical line from last dorsal spine to vent; interorbital space more deeply concave, its width in adult not quite length of eye; first dorsal spine nearly smooth; second spine 3 in head; pectorals a little more than ½ of the body. Color in life, olive brown above, becoming light olive on sides, white below; back with 3 brown cross bars, the first under spinous dorsal, the second under first third of second dorsal, the third under its end, all of these bars extending downward and forward to lateral line, the posterior forming a brown blotch on base of last dorsal rays; back and sides with numerous small white spots, irregular in shape and size; these often wanting; a lateral line running in a narrow brown streak; distinct broad reddish-brown streak from humeral spine backward to opposite end of anal; traces of a narrow streak above this; branchiostegal membrane yellowish above; a dark-brown streak from angle of mouth to base of preopercular spine; opercle dusky brown without, deep reddish brown within; caudal with a light-brown bar at base, then a broad translucent bar, the terminal ⅔ orange yellow, narrowly margined behind with white; spinous dorsal dusky, with a diffuse black blotch between fourth and sixth rays above; soft dorsal translucent brownish, without streaks of any kind; anal wine color, translucent at base and tip; ventrals light reddish; pectorals glaucous green within, the lower rays reddish, the upper white; the outer side dark greenish brown, unbarred, with a very narrow blue margin behind. This form is in some respects intermediate between *Prionotus strigatus* and *P. tribulus*. The color is in most particulars like that of *P. tribulus*, but the white spots on back and sides are much less numerous, or wholly wanting, and the brown bar backward from humeral spine is present, as in *P. strigatus*, and the dorsal fin is not barred; the gill rakers are, as in *P. strigatus*, slender and fine, 18 to 20 developed on lower limb; the spines on the head are not strong as in *P. tribulus*, that above orbit behind not conspicuously raised above surface of head. In 2 specimens from Beaufort, North Carolina, the pectorals are much lengthened, reaching nearly to base of caudal, but this seems to be here, as in *P. tribulus*, a very variable feature, as specimens from

Charleston have the pectorals but ½ length of body. The description of *Trigla evolans* given by Linnæus is of very little value, but the redescription of the type given by Dr. Bean leaves little doubt that it is this species. In this species the gill rakers are longer than in any other except its analogue, *P. strigatus*. Here described from specimens from Charleston and Beaufort. South Atlantic coast of United States; known only from North and South Carolina, where it is locally abundant. (*evolans*, flying out.)

Trigla evolans, LINNÆUS, Syst. Nat., Ed. XII, 498, 1766, Carolina (Coll. Dr. Alex. Garden); BEAN, Proc. U. S. Nat. Mus. 1885, 204; description of Linnæan type.

Prionotus sarritor, JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1882, 615, Charleston; Beaufort (Coll. Jordan & Gilbert); JORDAN & GILBERT, Synopsis, 974, 1883; JORDAN & SWAIN, Proc. U. S. Nat. Mus. 1884, 541.

Prionotus evolans, GILL, Cat. Fish. East Coast N. Am., 21, 1873; JORDAN & GILBERT, Proc. U. S. Nat. Mus. 1878, 374; JORDAN & GILBERT, Synopsis, 735, 1883; JORDAN, Cat. Fish. N. Am., 115, 1885; JORDAN, Proc. U. S. Nat. Mus. 1884, 541; JORDAN & HUGHES, Proc. U. S. Nat. Mus. 1886, 336.

2497. PRIONOTUS PUNCTATUS (Bloch).

Head 2⅘; depth 2⅘; eye 6 in head. D. X–12; A. 12; about 50 pores in lateral line. Body stout; head large; preopercular spine with a smaller one at its base; pectorals reaching past middle of anal, their length not quite ½ the body; gill rakers rather long and slender, about 10 developed; maxillary 2½ in head; a bluntish spine on edge of snout behind the serræ; behind this 1 or 2 smaller ones, at least in the young; no spine on cheek bone; groove behind the eye evident; interorbital area rather narrow, concave; preocular, supraocular, occipital and nuchal spines rather prominent; dorsal spines high, the third 2⅓ in head; first spine not serrate; mouth large, maxillary 2½ to 2⅖ in head, and reaching nearly to the eye; a small spine on center of radiation of cheek and 1 before it. Color nearly plain; spinous dorsal with dark clouds and without black ocelli; pectoral dark, with some round brown spots above; caudal dark barred; a whitish area on back between dorsals. Our description is taken from 2 small specimens collected (probably at Tuxpan) on the east coast of Mexico, by Mr. T. Salt; from the specimens in the museum at Paris, the types of Cuvier and Valenciennes, and from a specimen taken by the *Albatross* at Bahia. This species is certainly the *Prionotus punctatus* of Cuvier and Valenciennes, but it may not be the species figured by Plumier, to which Bloch has given the name of *Trigla punctata*. The figure of Plumier shows a bright-red body, with many small spots of a darker red, while red spots are scattered over all of the fins, except the spinous dorsal and the ventrals. In general form and in the armature of the head, so far as this is shown in the plate, Plumier's figure most resembles the present species, but the red color suggests a possibility that some of the deep-water species may have been intended. The present species corresponds better to the figure than any other yet known. Bloch's figure of *Trigla carolina*, which has been identified with *P. punctatus*, is almost certainly *P. tribulus*. West Indies and coast of South America; not known from the coasts of the United States. (*punctatus*, spotted.)

Trigla punctata, Bloch, Ichthyol., pl. 353, 1793, Martinique; on a drawing by Plumier; Cuvier, Règne Animal, Ed. 2, vol. II, 161, 1829.

Prionotus punctatus, Cuvier & Valenciennes, Hist. Nat. Poiss.,[*] IV, 93, 1829; Günther, Cat., II, 193, 1860 (in part); Jordan & Hughes, Proc. U. S. Nat. Mus. 1886, 332; Jordan, Proc. U. S. Nat. Mus. 1886, 544; Jordan, Proc. U. S. Nat. Mus. 1890, 328.

2498. PRIONOTUS BEANII, Goode.

Head 3; depth nearly 4; greatest width 4; eye nearly 4 in head or 2 in snout. D. X–12; A. I, 10; P. 13+3; V. I, 5; snout 2 in head, equal to mandible. Least height of tail nearly $\frac{1}{5}$ length of head, and equal to short diameter of eye; width of interorbital space on the bone about $\frac{1}{3}$ length of snout; a furrow behind eyes which is interrupted on nape; snout produced into 2 short, obtuse, serrated points, flanked behind on each side by a short but stout compressed spine; behind this on snout another short spine; a short spine on cheek bone; anterior nostril in a tube which is produced posteriorly into a flap; posterior nostril in a large, shorter tube; preopercular spine, also, with a short spine at its base; preocular and supraocular spines present; a pair of postocular spines on each side, one in front of the other; a pair of blunt spines on occiput and another on nape; length of opercular spine, measured back to the edge of preopercle, equal to length of postorbital part of head; humeral spine well developed, its length nearly equal to that of preocular; maxillary not reaching front of eye, its length equal to postorbital part of head; mandible reaching about to vertical front of eye, its length nearly $\frac{1}{2}$ length of head. Teeth in narrow, villiform bands in jaws and on vomer and palate; 8 developed gill rakers on the anterior arch, the longest about $\frac{1}{3}$ as long as eye; 5 rudiments below and 2 above the developed rakers of the anterior arch, these mere tubercles scarcely raised above the general surface. Distance of dorsal from tip of snout a little greater than length of head; length of base of spinous dorsal nearly 3 times length of eye; first spine serrate on its anterior margin for the greater portion of its height, nearly as long as the second, its length $\frac{2}{5}$ length of head; third spine longest, its length $\frac{1}{2}$ length of head; last 2 spines very small; third spine also serrated along its anterior margin for the greater portion of its height; a very slight interspace between the 2 dorsals; length of first ray of soft dorsal equal to that of second spine of dorsal; length of last ray equal to $\frac{1}{2}$ length of spinous dorsal base; length of middle caudal rays 3 times length of eye; caudal slightly emarginate; origin of anal immediately under origin of soft dorsal; length of anal base $\frac{1}{2}$ distance from anal to tip of snout, the spine only about $\frac{2}{3}$ as long as first ray, its length $\frac{1}{2}$ length of maxilla; length of longest anal ray $\frac{1}{2}$ length of spinous dorsal base; ventral extending to origin of anal, its length equal to anal base; pectoral when extended reaching to the line connecting the fifth ray of dorsal with sixth ray of anal, this fin emarginate behind, its longest ray slightly longer than head and more than twice length of longest dorsal spine, 7 rows of scales between lateral line and origin of second dorsal, 19 rows between lateral line and origin of anal, 50 pores in lateral line, and about 93 oblique rows of scales can be counted; scales on breast conspicuously smaller than the rest. Color in alcohol,.light brownish yellow above, lighter below; spinous dorsal with a black blotch between the fourth and fifth spines, its length about ⅔ that of eye; the membrane connecting the spines of dorsal with faint dusky shades in several places; membrane connecting the last 3 or 4 rays of second dorsal slightly dusky; pectoral with 2 broad dark areas, separated and surrounded by lighter, the dark markings on the pectorals not taking the form of bands, but having their greatest length nearly parallel with the axis of the fish. Length 4½ inches. Trinidad. (Goode & Bean.) (Named for Dr. Tarleton H. Bean.)

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[*] The types of Cuvier & Valenciennes in Paris seem to be the species usually called *Prionotus punctatus*. There is also a specimen in the museum, labeled, apparently in the handwriting of Valenciennes: "*Trigla punctata* nobis, Bl., 253. *Tr. carolina*, Bl., 252. *Prionotus evolans*, Lacèp. *Rubio volador*, Parra, tab. 38, du Brésil. Quoy et Gaimard, exp'n Freycinet." This specimen, 0.25 m. long, in good condition, is of the same species as the one described above. Longest dorsal spine $2\frac{1}{6}$ in head. Pores in lateral line 85 to 90.

Prionotus beanii, GOODE, in GOODE & BEAN, Oceanic Ichthyology, 468, pl. CXII, fig. 383, 1896, off Trinidad, in 73 fathoms. (Type, No. 39318. Coll. *Albatross*.)

2499. PRIONOTUS TRIBULUS (Cuvier).

(BIG-HEADED GURNARD.)

Head 2½; depth 5 (3 to 4 in young). D. IX or X–12 or 13; A. 11; P. 13+3; scales 49 (tubes). Body robust; head shorter and broader, snout shorter, and bones more strongly striate than in *P. evolans;* interorbital space deeply concave; occipital and supraorbital spines very strong and much compressed; band of palatine teeth as long as eye; gill rakers shortish, 9 below angle; membranaceous edge of opercle scaly; preopercular spine with a smaller one at its base, which is high and sharp; cheek bone with a spine (small in the adult, larger in the young) at the center of radiation; temporal ridge with 2 bluntish spines; bones of the head very sharply striate; young with 4 sharp, knife-like spines on side of cheek and snout, in a line before the preocular spine, these nearly disappearing with age; maxillary about 2⅛ in head; sides without dark longitudinal stripe. Gill rakers slender in the young, becoming shorter and thicker with age, about 10 developed on lower part of arch; head broad, the spines on its upper surface very prominent, all of them more or less compressed and knife-like, especially in the young. Second dorsal spine 2½ in head; pectorals moderate, 2 in body in the adult, 2½ in the young. Coloration in life, light olive green, the head and body everywhere reticulated with dark olive green, in definite patterns, the dark lines on the head conspicuous, arranged in a series of curves and concentric circles; the dark streaks on the body mostly undulating and ascending backward; a diffuse band along side of bright orange; belly white; 2 faint diffuse dark bands downward and forward from soft dorsal, the hindmost ascending on the fin; a fainter band on spinous dorsal; spinous dorsal reddish, clouded with darker; a large dark blotch, not ocellated, between fifth and sixth spines; second dorsal translucent reddish, with darker spots; anal similar, paler, the spots almost obsolete; caudal reddish, with 3 darker bands; ventrals plain light reddish; pectorals light, clear green on the front side, grayish behind; with about 5 somewhat irregular dark cross bands, the 3 median broadest and forked or Y-shaped above; upper edge of pectoral pale; pectoral appendages reddish, barred with darker. Young with soft dorsal, caudal, anal and ventral fins plain; spines proportionally longer and fins shorter. South Atlantic coast, from Long Island to Brazos Santiago; very common southward; our description chiefly from Galveston specimens, verified on others from Pensacola, Cedar Keys, Charleston, and Beaufort. A very abundant species, well distinguished from the others of the Atlantic by the greater development of the spines of the head. The young have these spines much larger and more compressed than the adult, and in the very young 3 or 4 strong knife-like spines are developed on each side of the snout, as in *P. horrens.* In very young examples the spine at the base of the preopercular spine is much larger than the latter. (*tribulus*, scraping, from the thorny head.)

Trigla carolina, Bloch, Ichthyologia, 352, 1793, Carolina; not of Linnæus.
Trigla tribulus, Cuvier, Règne Animal, Ed. 2, vol. 2, 161, 1829, America.
Prionotus tribulus, Cuvier & Valenciennes, Hist. Nat. Poiss., IV, 98, pl. 74, 1829, New York; Carolina; De Kay, New York Fauna: Fishes, 48, 1842; Günther, Cat., II, 195, 1860; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1878, 373 and 374; Goode, Proc. U. S. Nat. Mus. 1879, 111; Goode & Bean, Proc. U. S. Nat. Mus. 1879, 128; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 288; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 615; Jordan & Gilbert, Synopsis, 735, 1883; Bean, Cat. Fishes, London Intern. Exhibit., 49, 1883; Jordan & Swain, Proc. U. S. Nat. Mus. 1884, 233; Jordan, Cat. Fish. N. A., 115, 1885; Jordan & Hughes, Proc. U. S. Nat. Mus. 1886, 366.

2500. PRIONOTUS HORRENS, Richardson.

Head $2\frac{4}{5}$; depth $4\frac{1}{2}$; eye $5\frac{1}{2}$ in head. D. X–12; A. 10; scales about 100; gill rakers rather long, about 5 developed. Body rather stout; head large; interorbital area concave, $1\frac{1}{3}$ times diameter of the eye; bones of the head with strong, radiating striæ; a preocular and 2 postocular spines; occipital and temporal ridges not very prominent, each ending in a spine; opercular and humeral spines simple; preopercular spine with a smaller one at its base; nuchal spine present; snout emarginate, its lobes dentate, its length $2\frac{1}{4}$ in head; cheek with spine at point of radiation of striæ; a similar spine about $\frac{1}{3}$ distance to tip of snout; first dorsal spine nearly as long as second, its edge nearly smooth; the second the longest, its length 2 in head; edge of first dorsal ray smooth; longest dorsal ray $2\frac{1}{2}$ in head; longest anal ray $3\frac{1}{4}$ in head; caudal fin emarginate, $1\frac{3}{4}$ in head; pectorals rather short, their tips reaching about third anal ray, 3 in length of the body; ventrals not reaching anal by a distance equal to the diameter of the eye, $3\frac{3}{4}$ in length of body. Color, uniform brownish above, lighter below; spinous dorsal dusky; no distinct black blotch; soft dorsal and caudal fins irregularly barred; ventrals and anal white; pectoral dusky on basal third, the rest of the fin lighter, with an interrupted broad black transverse band across middle, a narrower one across the tip. Pacific coast of tropical America; not rare in shallow water; known from Mazatlan to the Galapagos. The specimens here described from Mazatlan and *Albatross* Station 3041, off Lower California. Young examples in the British Museum are almost exactly like the young of *P. tribulus*, differing chiefly in the still larger proportionate size of the knife-like spines on the head.

The following notes on the types of *Prionotus horrens* were taken by us in London: Three young specimen, allied to *P. tribulus*, but the spines still larger and more knife-like; first spine on edge of snout broad and serrate, 3 behind this progressively larger, then 2 large spines on preopercle, the posterior one the largest; 2 smaller ones on opercle, and 1 very large on the scapula; 2 sharp ones over each eye; 1 behind the eye; 2 on top of head and 2 on occiput. Mouth large, maxillary reaching front of eye, 2⅓ in head; gill rakers long and slender, 5; scales small; pectorals short, 3 in body, reaching somewhat past second dorsal front; pectorals and tip of caudal dusky; no groove behind the eye; belt of palatine teeth narrow. (*horrens*, bristling (creating horror), from the large head spines.)

Prionotus horrens, RICHARDSON, Voy. Sulph., Ichth., 79, pl. 42, figs. 1–3, 1843, Gulf of Fonseca; GÜNTHER, Cat., II, 195, 1860.

793. BELLATOR, Jordan & Evermann.

Bellator, JORDAN & EVERMANN, Check-List Fishes, 488, 1896 (*militaris*).

This genus is closely allied to *Prionotus*, differing chiefly in the great development of the first and second dorsal spines, which are about as long as body. Scales large and very rough. Snout short, abruptly descending. West Indies. (*bellator*, warrior.)

a. Body robust; scales large, 40 tubes; snout with serrated process. MILITARIS, 2501.
aa. Body slender; scales moderate, 60 tubes; snout without processes. EGRETTA, 2502.

2501. BELLATOR MILITARIS (Goode & Bean).

Head 3; depth $3\frac{1}{6}$; eye $10\frac{1}{2}$, = interorbital width; snout $2\frac{5}{14}$. D. X–11; A. I, 9; P. 12 + 3; V. I, 5. Body short, stout, its greatest width at base of pectorals nearly ¼ of length. Head short, snout abruptly descending and with 2 rather long diverging spinous processes at its tip. Orbits much elevated, spines large, and jaws small; distance measured obliquely from tip of rostral spine to edge of opercular flap 2½ in length; nearly all of the spines of head and exposed edges of preorbital, mandible, and opercles minutely serrate; the diverging spines upon snout themselves armed along margin by numerous spinules; a strong spine on preopercle, with a secondary spine at its base; the spine on preopercle as long as snout; a stout spine on operculum, another in humeral region, another on nape extending backward to base of fourth dorsal spine. Teeth in jaws, and on vomer and palate, very small, in villiform bands. Length of maxillary a little greater than that of eye; length of mandible a little less than that of snout, reaching about to the vertical from front of eye; a furrow across nape immediately behind eyes; 9 developed gill rakers on the anterior arch, besides several rudiments; all of the gill rakers very short. Pseudobranchiæ present. Branchiostegals 7. Distance of dorsal from tip of snout 2½ in body; first 2 dorsal spines much produced; length of first almost equal to standard length; length of second slightly greater than that of first; the short spine about twice as long as mandible; when the dorsal spines are fully extended they reach nearly to tip of caudal; anterior margins of first 3 spines minutely serrated, the serrations being in several rows; longest ray of soft dorsal about ½ as long as head; length of middle caudal rays equal to length of anal base; caudal slightly emarginate; length of pectoral a little less than 2 in body; longest separate ray of pectoral about 1½ times as long as shortest, its length equal to that of middle caudal rays; length of ventral spine ½ of length of longest ventral ray; ventral when extended reaching to third ray of anal; longest anal ray about ½ as long as head; scales very rough, in about 7 rows between origin of second dorsal and lateral line, and 19 rows below lateral line; lateral line with about 40 tubes, the number of rows of scales counted obliquely about 55. Color in life, rosy; head and pectoral speckled with dark brown; 6 or 7 small dark blotches on upper edge of pectoral. Some specimens have the inner surface of pectoral dark on its lower half. In 1 specimen the dark blotches on pectoral are grouped into 4 half bands, of which the middle 2 are very small. Off Cape Catoche, Yucatan, Gulf of Mexico. (Goode & Bean.) (*militaris*, like a soldier, from the high spines.)

Prionotus militaris, GOODE & BEAN, Oceanic Ichthyology, 464, pl. CXI, fig. 380, and pl. CXII, fig. 384, 1896, off Cape Catoche, Yucatan, in 25 fathoms. (Coll. *Albatross*.)

2502. BELLATOR EGRETTA (Goode & Bean).

Head 2⅔; depth 4½; eye 3½ in head; snout 2⅓; interorbital width 2 in eye. D. XI–11; A. I, 10; P. 12+3; V. I, 5; gill rakers $x+9$; maxillary nearly 3; mandible 2⅓; scales 9–100–32, 60 tubes. Body rather slender, tapering rapidly posteriorly; head moderately long; snout not descending so abruptly as in *P. militaris*, without projections in front. Spines of head moderately strong, without subsidiary basal spines; opercular and preopercular spines about equal in length, 2 in snout; exposed edges of bones of head minutely serrated, teeth at end of snout slightly enlarged; humeral spine small; nuchal spines not well developed; 1 or 2 spines at front of supraorbital, and 2 or 3 at its posterior portion. Teeth in villiform bands on jaws, and on vomer and palatines, the vomerine band very narrow. A slight groove across the nape immediately behind eyes, continued downward by an interspace between the preopercle and opercle. Distance from tip of snout to origin of dorsal equal to length of head; base of spinous dorsal equal to length of head without snout; first dorsal spine coarsely serrated for first sixth of its length, produced into a filament extending beyond end of caudal, the spine thus exceeding length of fish; second spine nearly as long as base of fin, the last 3 small; several succeeding spines also weakly serrated on their anterior margins; first ray of second dorsal serrated on anterior margin, the rays increasing in size to the ninth which is nearly ½ length of head; caudal somewhat emarginate, length of middle rays a trifle longer than base of spinous dorsal; origin of anal almost directly opposite that of second dorsal; length of anal spine about ⅔ that of first ray, the rays increasing in length posteriorly, the ninth being 2 in base of second dorsal; longest separate pectoral ray as long as base of second dorsal, the shortest 2 in head; ventrals reaching origin of anal. Color light brownish yellow on back, paler beneath; fins, except pectoral and ventral, pale; pectoral with 5 dark bands, the third extending entirely across the fin. Known only from the type taken off Barbados between 100 and 200 fathoms. (*egretta*, an egret, in allusion to the elongate dorsal ray, resembling the plume of an egret.)

Prionotus egretta, GOODE & BEAN, Oceanic Ichth., 465, fig. 381, 1896, off Barbados, at Blake Station 64. (Type in Mus. Comp. Zool.)

794. CHELIDONICHTHYS, Kaup.

(SMALL-SCALED GURNARDS.)

Chelidonichthys, KAUP, Archiv f. Naturgeschichte 1873, 87 (*hirundo*).

This genus differs from *Prionotus* chiefly in the absence of palatine teeth. The scales are much smaller, and the pectoral fins less developed; a series of bony, spinous plates extends along the base of the dorsal fin, a pair of them to each ray, the fin thus running in a shallow groove; there are no plates along the lateral line; caudal fin usually emarginate. Lateral line usually forking at base of caudal, the branches running to tip of fin. The numerous species abound on the coasts of Europe, Africa, and India; ranging north to Japan. (χελιδὼν, swallow; ἰχθύς, fish.)

2503. CHELIDONICHTHYS PICTIPINNIS (Kaup).

The following description* is taken from Dr. Kaup's original type, kindly sent us from the museum in Hamburg by Dr. Georg Pfister, Curator:

Head 3⅓ (to tip of rostral lobe); depth 5⅙. D. IX–16; A. 15; pectoral 10 + 3 detached rays; scales about 68. Width of head 1⅚ in its length; width of nape between occipital spines 3½ in length of head; upper profile of snout straight. Snout long, a little more than twice in head; emarginate at tip, the preorbitals extending beyond it on either side; each preorbital with about 5 blunt spines. Mouth very wide, its greatest width (measured inside) 2⅕ in head; maxillary reaching front of orbit, 2⅖ in head. Vomerine teeth present in a small crescent-shaped patch, villiform; no teeth on palatines; a wide band of well-developed villiform teeth present on each jaw. Eye large, 4⅗ in head. Interorbital space deeply concave, 1⅗ in eye. Depth of caudal peduncle 1½ in eye. Gill rakers 9, about 2½ in eye. Bones of the head covered with radiating striæ which are comparatively fine, smooth and regular; preopercle with 2 spines at the angle, the upper much the larger; opercle ending in 2 spines; humeral spine long and strong; supraorbital rim anteriorly with 2 spines; a bony groove extending the entire length of the dorsals, formed by 24 plates, each of which ends on the side in a spine; a short, somewhat obscure transverse groove behind each eye, the two not continued across the occiput. Scales small, cycloid, present on back, sides, and belly; none on fins excepting on caudal, on which they extend nearly to tip; those in lateral line elongate, enlarged. Pelvic bone diamond-shaped, not scaled, $1\frac{2}{7}$ in head, its width twice in its length; region of axil of ventrals and pectorals naked. Base of spinous dorsal $1\frac{1}{2}$ in head, third spine $1\frac{3}{4}$ in head, all the spines smooth; base of soft dorsal $1\frac{1}{8}$ times as long as head, longest soft ray $2\frac{1}{2}$ in head; base of anal slightly greater than head; pectoral reaching about to seventh anal ray, $2\frac{4}{7}$ in body; the upper detached pectoral ray the longest, $1\frac{1}{3}$ in head, middle detached ray $1\frac{1}{6}$ in upper, lower $1\frac{1}{4}$ in middle; ventrals reaching origin of anal, $1\frac{1}{8}$ in head. Color (in spirits): back and upper half of sides reddish brown; lower portion of sides golden silvery; belly, anal, base of pectorals, and base of ventrals white; head light chocolate brown; dorsals, caudal, ventrals, and detached rays of pectoral translucent, the membrane of pectorals satin-like and very dark brown, the rays white; 6 or 7 conspicuous, small white spots on the inside of pectoral on its lower half. Type 13 inches long, in the museum at Hamburg, said to have been sent from Barbados. This specimen agrees perfectly with descriptions of *Chelidonichthys kumu* (Lesson & Garnot) from New Zealand. It probably came from the South Seas, not from Barbados, and should not be admitted in this work. *Chelidonichthys spinosus* McClelland, of which we have specimens from Japan, although closely related, is a different species.

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* Dr. Pfister sends the following note under date of January 2, 1896:
"Das Kaup'sche Original-Stück von *Trigla pictipinnis* war in unseren Katalogen nicht enthalten; erst durch längere Studien im Archiv ergab sich, dass das Stück, welches ich Ihnen nunmehr übersandt habe, thatsächlich das Original-Stück von Kaup ist; es stand im Museum als *Trigla hirundo*, Barbados, Ug. Ehrhardt."

The following is the substance of Dr. Kaup's account:

Pectoral reaching seventh or eighth anal ray; dorsal spines smooth, reddish brown above, yellow on sides; belly white; pectoral colored on the inner side as in *Trigla peronii* and in *Trigla kumu* ("a large black blotch and white spots in variable number"). First dorsal uniformly colored; 4 black spots along median line of back, and 2 spots on side, parallel with the first 2 dorsal spots; a black spot before the first dorsal spine; a similar spot below the hinder half of the eye. One specimen a foot long in the Hamburg Museum from Barbados. (Kaup.)

The subgenus *Chelidonichthys* to which it is referred is thus described:

Preorbital plate of the steeply truncate snout somewhat prominent, with blunt teeth; spines of preopercle and opercle short; first dorsal with slender spines, the anterior entirely smooth or somewhat rough; first dorsal with 9 or 10; second with 1 spine and 16 soft rays; anal with 15 or 16 soft rays; scales very small; lateral line somewhat prominent, without spines. The species reach a length of 8 inches to a foot or more. (*pictus*, painted; *pinna* fin.)

Trigla pictipinnis, Kaup, Archiv für Naturgeschichte 1873, 87, Barbados? (Coll. Ehrhardt. Type, Mus. Hamburg.)

795. TRIGLA (Artedi) Linnæus.

(Mailed Gurnards.)

Trigla (Artedi) Linnæus, Syst. Nat., Ed. x, 300, 1758 (*cuculus*).

This genus differs from *Chelidonichthys*, with which it agrees in the absence of palatine teeth, in having the sides of the body armed with transverse bony plates, crossing the lateral line. Species numerous; very abundant in the Mediterranean. (*τρίγλα*, *Trigla*, classical name of *Mullus barbatus*, still used by the fishermen of the Adriatic, transferred to this group by Artedi for no evident reason.)

2504. TRIGLA CUCULUS, Linnæus.

(RED GURNARD.)

Head 3¼; depth 5⅘. D. IX–17; A. 16; plates along lateral line 65; eye 5⅗ in head; second dorsal spine 1½; pectoral 1⅒; anal 1⅕; caudal 1½. Body not anywhere compressed; head everywhere covered with rough, bony plates; mouth moderate, with bands of villiform teeth on jaws and vomer; maxillary scarcely reaching to front of eye; snout truncate, with 2 or 3 spines on each side; eyes placed high; a couple of spines on supraorbital rim above anterior edge of eye; interorbital deeply concave; posttemporal, with its upper surface rugose, ending as a spine behind; a couple of spines on opercle in front of the flap; a spine on clavicle just above pectoral fin; a series of long, narrow plates along lateral line; back and sides covered with small scales, belly naked; a ridge of about 26 spines extending along base of dorsals, ending at posterior end of soft dorsal; spinous dorsal triangular in outline, the second spine the longest, spines rapidly decreasing in length behind it, second spine reaching to soft dorsal when depressed; pectoral long and narrow, reaching to front of anal; ventrals inserted a distance of ½ eye behind lower end of base of pectoral, reaching nearly to tip of pectorals; caudal long and emarginate. Color rose-red on back, white below; inner face of pectoral blackish, the outer face slightly dusky; other fins dusky. Southern Europe; said by Cuvier to have been once brought from New York by Milbert; a very doubtful record. No recent collector has found any species of *Trigla* in American waters. The specimen here described is from the Paris market. (*cuculus*, cuckoo.)

Trigla tota rubens, ARTEDI, Genera Piscium, 45, 1738.

Trigla cuculus,* LINNÆUS, Syst. Nat., Ed. X, 301, 1758, Mediterranean, open sea; after ARTEDI.

Trigla pini, BLOCH, Ichthyol., pl. 355, 1793; GÜNTHER, Cat., II, 199; CUVIER & VALENCIENNES, Hist. Nat. Poiss., IV, 26; DE KAY, New York Fauna: Fishes, 43, pl. 70, 1842; DAY, Fish. Gt. Brit., 58, 1880.

Family CLXXXV. PERISTEDIIDÆ.

(THE DEEP-WATER GURNARDS.)

Body elongate, fusiform, covered with bony plates, each of which is armed with a strong spine; head bony; each preorbital produced into a long, flat process, which projects more or less beyond the mouth; mouth small, inferior, like that of a sturgeon; teeth none; lower jaw provided with barbels; gill membranes separate, narrowly joined to the isthmus anteriorly; gill rakers slender. Dorsal fin continuous or divided. Pectoral fin short, with the 2 lowermost rays detached. Ventrals I, 5, separated by a broad, flat area. Air bladder simple. Pyloric cæca about 10. Color generally red. Deep-sea fishes; 2 or 3 genera and about 13 species known, bearing some resemblance to young sturgeons.

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* *Polynemus tridigitatus*, MITCHILL, Trans. Lit. and Phil. Soc., I, 449, 1815, New York (no description), referred by Dr. Günther to the synonymy of *Trigla cuculus*, is apparently based on a recollection of some species of *Prionotus*. It is certainly not a *Trigla*.

a. Barbels at angle of mouth in large tufts of fringes; dorsal fins 2. PERISTEDION, 796.
aa. Barbels at angle of mouth minute, simple or nearly so; dorsal fins 2. VULSICULUS, 797.

796. PERISTEDION, Lacépède.

Peristedion, LACÉPÈDE, Hist. Nat. Poiss., III, 368, 1802 (*malarmat=cataphractum*).
Peristethus, KAUP, Proc. Zool. Soc. Lond. 1859, 103 (*cataphractus*); amended spelling.

Barbels large, forming large fringed tufts at angles of mouth and on lower jaw. Dorsal fins 2; characters otherwise included above. (*περί*, around; *στηθίον*, diminutive of *στῆθος*, breast, the breast being mailed.)

- *a.* Body rather robust, the depth 4½ to 5 in length to base of caudal; head about 2½ in length; barbels long.
  - *b.* Length of preorbital extension about 3½ in snout; color uniform crimson. MINIATUM, 2505.
  - *bb.* Length of preorbital extension 2 in snout; color red, with a black blotch near tip of pectoral, and black on caudal. LONGISPATHUM, 2506.
- *aa.* Body slender, the depth 6 to 6½ in length to base of caudal; head 3 to 3½; barbels moderate; fins mottled or blotched.
  - *c.* Body very slender; preorbital process 2¼ in snout; color yellowish; a pearly lateral band; back dotted; fins mottled. GRACILE, 2507.
  - *cc.* Body much depressed; preorbital process 3 in snout; color red, mottled and blotched. PLATYCEPHALUM, 2508.

2505. PERISTEDION MINIATUM, Goode.

Head 2½; depth 5. D. VII–18; A. 17; C. 16; P. 10+2; V. I, 5; plates 27 to 29. Armature of body essentially as in *Peristedion brevirostre*;* spines of abdominal plates very weak posteriorly; length of preorbital process 3½ in distance from its extremity to front of orbit; interorbital space deeply concave; protuberance on the forehead very slight; a pair of spines on upper surface of snout behind base of preorbital processes; a larger pair on preorbital processes; ridge of preopercle ending in a depressed, short, sharp-pointed spine; about 10 small tentacles on each side of lower jaw, those near the symphysis smallest. Long tentacles at angle of mouth fringed, extending to bases of pectorals. Length 12 inches. Gulf Stream, in various localities, at a depth of about 150 fathoms. (Goode.) (*miniatus*, scarlet.)

Peristedion miniatum, GOODE, Proc. U. S. Nat. Mus. 1880, 349, Gulf Stream, off Rhode Island; JORDAN & GILBERT, Synopsis, 733, 1883; GOODE & BEAN, Oceanic Ichthyology, 470, pl. CXIII, figs. 385, 385A, B, 1896.

2506. PERISTEDION LONGISPATHUM, Goode & Bean.

D. VIII–19; A. 19. Body high anteriorly, its greatest height 4½ in total length; length of head without prolongations 2½ in total length, with prolongations 2. Crown of head flat, separated from nuchal plate by a deep furrow, which is convex forward. Interorbital space deeply concave, the supraorbital margins being swollen, its width equaling long diameter of orbit. No protuberance on forehead, which is much depressed, its outline descending abruptly and rapidly in front of eyes; a ridge but no spine beneath eye. Length of snout, including the preorbital extension, more than ½ length of head; preorbital extension equaling ½ length of snout; the processes flat, rounded anteriorly, and covered with minute granulations; they diverge considerably, the distance of the tips apart being nearly twice that at their bases; a ridge arises at base of preorbital process and extends to angle of preoperculum, and its width at the angle is contained twice in diameter of orbit; a narrow, inconspicuous, and interrupted ridge below; a ridge on operculum, ending in a sharp spine at the angle, its length equal to diameter of eye. Jaws feeble, toothless; lower jaw with 2 long, much fringed barbels and 14 shorter ones; length of the long barbels twice diameter of the eye; maxillary not reaching vertical through anterior margin of eye; diameter of eye 4 in length of head without its prolongations; greatest width of head over preopercular ridge, 3 in total length. Dorsal origin directly in a line with upper angle of gill opening; longest spine slightly longer than width of interorbital space; anal origin under that of second dorsal; caudal small, slightly emarginate, length of its middle rays 1½ times diameter of eye; ventrals slightly in advance of pectorals, and extending farther back, reaching slightly beyond vent and to vertical through seventh row of scales; pectoral short, extending to vertical from fifth scale of the lateral line, the longest detached ray to the sixth; 29 rows of scales. Color in life bright roseate; a black blotch near tip of pectoral; dorsal with narrow dark margin; tip of caudal black. The elongation of the preorbital extension is noticeable in the smallest examples. (Goode & Bean.) West Indies, off Cuba and Barbados. (*longus*, long; *spatha*, sheath.)

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* See Günther, Cat., II, 218, 1860.

Peristedium longispatha, GOODE & BEAN, Bull. Mus. Comp. Zool., XII, No. 5, 166, 1886, off Santa Cruz, in 314 fathoms (Coll. Blake); off Barbados, 209 fathoms (Coll. Blake), and at other stations in the Gulf of Mexico (Coll. *Albatross*); GOODE & BEAN, Oceanic Ichthyology, 472, pl. CXIV, fig. 386, 1896.

2507. PERISTEDION GRACILE, Goode & Bean.

B. 7 or 8. D. VIII–20; A. I, 18; P. 11 + 2; V. I, 5. Body very slender, its greatest height nearly $\frac{1}{6}$ of length. Length of head to tip of the prolonged rostral spine 48 mm.; without the prolongations its length is 36 mm. or twice the greatest height of the body. Interorbital space deeply concave; interorbital width ½ length of snout, including rostral spine. Forehead descending gently toward snout, the supraorbital crests very little elevated. The rostral spine on each side continued backward by a slight bony ridge ending in a blunt spine at the angle of preoperculum. Opercular spine small, the length of operculum with the spine being about equal to length of eye. Length of snout with preorbital extension a little less than 4 in body; length of spine alone nearly equal to length of mandible. Jaws feeble and toothless; length of maxillary ¼ length of head; length of mandible ½ length of snout with preorbital extension;

mandible with 2 groups of barbels, 1 on each side of its lower edge; length of longest barbel equaling that of eye; barbels subdivided into several fringes, the number of barbels on each side of the mandible may be divided up into 8 or 9 clusters; mandible extending to vertical through front of eye; 26 gill rakers on first arch, the longest half as long as eye. Longitudinal diameter of eye nearly equal to width of interorbital space; greatest width of head over preorbital ridge ½ length of snout including the preorbital extension. Spinous dorsal originating directly above end of the opercular flap; the first spine slightly the longest, its length equaling length of snout and its projecting spine, also short diameter of eye; longest ray of second dorsal nearly ¼ length of head; least height of tail ⅓ length of eye. Anal origin under second ray of soft dorsal, the fin extending as far back as the dorsal, the length of its base being 4 times the width of interorbital area, the rays about as long as those of second dorsal; length of middle caudal rays ¾ length of eye, the fin being emarginate; ventral base under pectoral base, the fin reaching to vent, its length twice that of eye; pectoral short, reaching to below eighth scute of the lateral line, the longest detached ray reaching to below the ninth scute of the lateral line, its length equaling ½ length of head; 30 scutes in the lateral line. Color (of alcoholic specimen) very light yellow, a broad pearly band along the sides; back stippled with light brownish; pectorals with dark mottlings. Gulf of Mexico. Known from 1 specimen, 5 inches long. (Goode & Bean.) (*gracilis,* slender.)

Peristedion gracile, GOODE & BEAN, Ocean Ichthyology, 473, pl. CXIV, fig. 387, 1896, Gulf of Mexico, in 142 fathoms, 28° 28′ 30″ N., 85° 52′ 30″ W., at Albatross Station 249.

2508. PERISTEDION PLATYCEPHALUM, Goode & Bean.

D. VIII–17; A. 17. Body much depressed, its greatest height 6⅓ in body length, 6¾ in total. Length of head without prolongations, twice the height of body, 3½ in its length, with prolongations 2½ in body length. Interorbital space deeply concave, the supraorbital margin being swollen, its width equal to the long diameter of the eye. No protuberance on the forehead, which is much depresssd, its outline descending abruptly and rapidly in front of the eyes. A ridge below the eye, not armed; a small vertical spine behind each nostril. Stout spines upon the operculum and several upon the vertex. The length of the snout, with its extensions, is ½ the length of the head, its processes about 3 in its own length. The processes are flat, triangular, diverging slightly, the distance apart of their tips 2 to 2½ that at their bases. A ridge extending backward from base of each process along the lower edge of the preoperculum, ending behind in a sharp, flat spine; the greatest width of the expanded portion, on the preoperculum, only ¼ as wide as the eye; beneath this another less conspicuous ridge with minutely serrated edge, which is double in front and single behind, the 2 portions separated by a slight notch. Jaws normal, the 2 tentacles much fringed, their length not much exceeding the diameter of the eye; between them, and placed about equidistant from each, are 2 bunches of short tentacles, about 4 in each. Chin with numerous short tentacles, some of them as long as the eye, arranged for the most part in bunches of 4. Maxillary not reaching anterior margin of orbit. Diameter of eye nearly 4 in greatest length of head, and exactly ½ of total length of snout. Greatest width of head, over the preopercular ridges, nearly equal to its own length without the processes. Dorsal origin over the upper angle of gill opening; longest spine equal to that of postorbital portion of head; anal origin about under origin of second dorsal, a trifle farther back, and in the vertical through the space between the seventh and eighth lateral scutes; the fin about as high as the dorsal; caudal small, slightly emarginate, with tips slightly produced, length of middle rays equal to that of dorsal; ventral origin in advance of the axil of the pectorals, the fin extending slightly beyond vent, but not quite to origin of anal, its length about twice length of dorsal. Pectoral rather long, extending to ninth scute of lateral line and past vertical through origin of anal; 29 rows of scutes. Color red; body and fins mottled and blotched with darker. Known from 2 specimens taken off Barbados, West Indies. Type from *Blake* Station LX, in 123 fathoms; the other from 288 fathoms. (Goode & Bean.) (*πλατύς*, broad; *κεφαλή*, head.)

Peristedion platycephalum, GOODE & BEAN, Bull. Mus. Comp. Zool., XII, No. 5, 167, 1886, off Barbados in 123 fathoms (Coll. the *Blake*); GOODE & BEAN, Oceanic Ichthyology, 474, pl. CXIV, fig. 388, A, B, 1896.

797. VULSICULUS, Jordan & Evermann.

Vulsiculus, JORDAN & EVERMANN, Check-List Fishes, 489, 1896 (*imberbe*).

This genus differs from *Peristedion* chiefly in the reduction of the barbels on the lower jaw and the angle of the mouth. These are minute and simple, or nearly so, and scarcely appreciable. (*vulsus*, plucked; hairless.)

2509. VULSICULUS IMBERBIS (Poey).

Body somewhat slender, its greatest height 4½ times in distance between tip of snout and base of caudal. Length of head without prolongations 2½ in total length; with prolongations, 2. Crown of head flat; interorbital space concave, with a depressed groove in its middle, branching posteriorly along the base of the supraorbital crests, its width somewhat greater than the horizontal diameter of orbit. No protuberances on forehead or on the snout above, and no ridges or spines beneath eye. Length of snout, including the preorbital extension, equal to length of head; preorbital extension about ⅖ of length of snout. Preorbital processes flat, unarmed, and somewhat divergent; a ridge arising at base of preorbital process and extending to angle of preoperculum, where it terminates in a blunt spine; a low ridge on operculum, ending in a rather inconspicuous spine; another above and close to it, pointing upward. Length of opercular ridge of spines nearly equal to horizontal diameter of eye. Jaws feeble and apparently toothless; barbels on lower jaw so inconspicuous as to be scarcely visible; maxillary extending almost to vertical through anterior margin of eye; diameter of eye 4 times in length of head without its prolongations. Dorsal origin directly in line with upper angle of gill opening; the origin of anal under that of second dorsal; ventrals slightly in advance of pectorals, and not so far back, though their tips reach somewhat beyond vent; pectorals rather long; about 25 rows of scales. Gulf of Mexico. The type, about 2 inches long, is in the Museum of Comparative Zoology at Cambridge, and has been examined in the preparation of this description, but the example being unique and small, we have not ventured to examine it so closely as would have been practicable with more material. It is, however, apparently a well-marked species, resembling in a general way *P. longispathum*. It was obtained by Poey from the stomach of *Polymixia nobilis*, taken near Cuba in deep water. (Goode & Bean). Near Cuba, in deep water, from stomachs of *Polymixia* (Coll. Poey). A few specimens in bad condition were taken by Jordan & Stearns from stomachs of Groupers and Snappers on the Snapper Banks off Pensacola. In these specimens, which seem to represent Poey's *imberbis*, the dorsal rays are about V–19, scutes 30; each side of body with 4 rows of spinous plates, the ventral series with hooked spines. (*imberbis*, beardless.)

Peristedion imberbe, POEY, Mem. Hist. Nat. Cuba, II, 367, 389, 1861, Cuba; POEY, Rep. Fish. Nat. Cuba, II, 158, 1866; JORDAN, Proc. U. S. Nat. Mus. 1884, 38; GOODE & BEAN, Oceanic Ichthyology, 472, 1896.

Peristedion micronemus, POEY, Ann. Lyc. Nat. Hist. N. Y., IX, 1870, 321, Cuba; substitute name on finding the existence of barbels.

Peristethus micronema, GÜNTHER, Challenger Report, Deep Sea Fishes, XXII, 65, 1887.

Family CLXXXVI. CEPHALACANTHIDÆ.

(THE FLYING GURNARDS.)

Body elongate, subquadrangular, tapering behind; head very blunt, quadrangular, its surface almost entirely bony; nasals, preorbitals, suborbitals, and bones of top of head united into a shield; nuchal part of shield on each side produced backward in a bony ridge, ending in a strong spine, which reaches past front of dorsal; interocular space deeply concave; preorbitals forming a projecting roof above the jaws; preopercle produced in a very long rough spine; cheeks and opercles with small scales; opercle smaller than eye; gill openings narrow, vertical, separated by a very broad, scaly isthmus; pseudobranchiæ large; gill rakers minute; mouth small, lower jaw included; jaws with granular teeth; no teeth on vomer or palatines; scales bony, strongly keeled; 2 serrated, knife-like appendages at base of tail; first dorsal of 4 or 5 rather high flexible spines, the first 1 or 2 spines nearly free from the others; an immovable spine between the dorsals; anal and second dorsal short, of slender rays; caudal small, lunate; pectoral fins divided to the base into 2 parts, the anterior portion about as long as the head, of about 6 rays, closely connected; the posterior and larger portion more than twice length of head, reaching nearly to caudal in the adult (*Dactylopterus*); much shorter in the young (*Cephalacanthus*); these rays very slender, simple, wide apart at tip; ventral rays I, 4, the long fins pointed, their bases close together, the inner rays shortest; air bladder with 2 lateral parts, each with a large muscle; pyloric cæca numerous; vertebræ 9 +[*] 13 = 22. Warm seas; the adult able to move in the air like the true flying-fish, but for shorter distances. One genera and 2 to 4 species.

798. CEPHALACANTHUS, Lacépède.

(Flying Gurnard.)

Cephalacanthus, Lacépède, Hist. Nat. Poiss., iii, 323, 1802 (*spinarella*); young examples of the East Indian species.

Dactylopterus, Lacépède, Hist. Nat. Poiss., iii, 325, 1802 (*pirapeda* = *volitans*); adults of the American species.

Gonocephalus, Gronow, Cat. Fish., Ed. Gray, 106, 1854 (*macrocephalus* = *volitans*).

Character of the genus included above. Two species known, the following and the East Indian, *Cephalacanthus spinarella*. (*κεφαλή*, head; *ἄκανθα*, spine.)

2510. CEPHALACANTHUS VOLITANS (Linnæus).

(Flying Robin; Bat-fish; Volador; Murciélago.)

Head 4⅓; depth 5½. D. II–IV, 8; A. 6; P. 28 + 6. First 2 dorsal spines free, slightly connected by membrane at base; preopercular spine reaching beyond base of pectorals, not to end of occipital spine; pectorals reaching nearly to base of caudal in adult, very much shorter in young; in the young the spines of the head are much longer. Greenish olive and brown above, of varying shades; below pale, marked irregularly with dusky and bright brick red, varying to salmon yellow; pectoral fins mottled with bright-blue streaks near the base and blue spots and bars toward the tip; their under sides glaucous blue, edged with darker; caudal fin with about 3 brownish-red bars; coloration extremely variable. Length 12 inches. Atlantic Ocean, on both coasts; very abundant on South Atlantic and Gulf coasts; a handsome and singular fish. (Eu.) (*volitans*, flying.)

Pirabebé, Marcgrave, Hist. Brasil., iv, 162, 1648, Brazil.

Milvus cirratus, Sloane, Hist. Jamaica, ii, 288, Jamaica.

Trigla digitis vicenis palmatis, Artedi, Genera, 44, 1738, Mediterranean, etc.

Hirundo, Catesby, Nat. Hist. Carolina, ii, tab. 8, Bahamas.

Trigla volitans, Linnæus, Syst. Nat., Ed. x, i, 302, 1758; after Artedi; "Mari Mediterraneo Oceanio, Pelago inter tropicos, in Asia ad Cap. b. Spei. Sæpe agitata evolans ex aqua."

Dactylopterus volitans, Cuvier & Valenciennes, Hist. Nat. Poiss., iv, 117, 1829; Günther, Cat. Fishes, ii, 221, 1860; Lütken, Spolia Atlantica, 417, 1880.

Trigla tentabunda, Walbaum, Artedi, Piscium, iii, 362, 1792; after *Cataphractus*, Klein, Missus, which is after Catesby, Fishes of Carolina, iv, 44, taf. 14, f. 1.

Trigla fasciata, Bloch & Schneider, Syst. Ichth., 16, tab. 3, f. 1, 1801; after *Corystion*, Klein, Missus, iv, 45, taf. 14, f. 2, locality not stated.

Dactylopterus pirapeda, Lacépède, Hist. Nat. Poiss., iii, 326, 1802, Mediterranean and almost all warm seas.

Polynemus sexradiatus, Mitchell, Trans. Lit. and Phil. Soc., i, 1815, pl. 4, f. 10, New York.

Callionymus pelagicus, Rafinesque, Amer. Monthly Mag., Jan., 1818, 205, Atlantic Ocean.

Dactylopterus communis, Owen, Osteol. Cat., i, 56, 1851.

Gonocephalus macrocephalus, Gronow, Cat. Fish., Ed. Gray, 106, 1854, pelagic.

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[*] The osteological characters of this family are given (after Gill) on page 2147.

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